UNIFIED WATERSHED ASSESSMENT
ONEIDA TRIBE OF INDIANS OF WISCONSIN

Introduction

The Unified Watershed Assessment (UWA) was prepared by the Oneida Nation, under guidelines contained in the Clean Water Action Plan (CWAP), to accelerate coordinated watershed restoration on the Oneida Reservation so as to achieve maximum resource benefits. The UWA describes the watershed, categorizes surface waters, and provides the framework for coordination with local, state, and federal partners to restore and protect water quality on the Oneida Reservation and in the Northeast Wisconsin region.

The Oneida UWA was developed in consultation and cooperation with the Wisconsin Department of Natural Resources (WDNR), U.S. Environmental Protection Agency (USEPA), U.S. Department of Agriculture (USDA), and the Bureau of Indian Affairs (BIA).

Jurisdictional Setting

The 65,400-acre Oneida Reservation is located southwest of the city of Green Bay and west of the Fox River. It straddles the boundary of Brown and Outagamie Counties and includes all or portions of the City of Green Bay, Villages of Ashwaubenon and Howard, and the Towns of Hobart, Oneida, and Pittsfield. Eleven additional municipalities rest within the watersheds flowing through the Reservation.

Physical Setting

The Duck and Ashwaubenon Creek watersheds rest, for the most part, on the dolomitic limestone of the Sinnipee group. Along many miles of its course the Duck Creek has cut through overlying glacial material into the limestone layer -- this may have resulted in some connectivity between surface and ground waters, potentially affecting surface flows. The watershed is characterized by gently rolling topography and silty-clayey till soils. The area has a modified continental climate. Mean annual precipitation averages twenty-nine inches.

Hydrologic Setting

All surface waters of the Reservation drain to the Great Lakes Basin (Lake Michigan), and correspond to the following hydrologic unit codes (HUC):

- **04030103 Duck-Pensaukee** -- This assessment addresses the Duck Creek portion of this hydrologic unit. The Pensaukee River does not drain from the Oneida Reservation.

- **04030204 Lower Fox River** -- Portions of the this hydrologic unit (Ashwaubenon Creek, Dutchmans Creek) drain through the Oneida Reservation.

The Duck and Ashwaubenon Creeks are the primary watersheds draining the Reservation. Both are subwatersheds of the 6,635 square mile Fox/Wolf River basin. They represent less than five-percent of the total land area within the basin (265 square miles), yet contribute more than twenty-five percent of the total nonpoint source loading to lower Green Bay (*Duck, Apple, and Ashwaubenon Creeks Priority Watershed Project (PWP), WDNR, 1997*). The northwest corner of the Reservation drains to the South Branch of the Suamico River.

Approximately 233 miles of rivers, creeks and streams flow through the Oneida Reservation. The primary surface water drainage areas (including tributaries), consist of:

- Duck Creek River -- Fish Creek, Oneida Creek, Trout Creek, Lancaster Brook, Beaver Dam Creek, Silver Creek (*Lower Green Bay Basin*)
- South Branch of the Suamico River -- (*Upper Green Bay Basin*)
- Ashwaubenon Creek -- North Branch, South Branch, Hemlock Creeks (*Fox River Basin*)
- Dutchmans Creek -- (*Fox River Basin*)

Categories/Assessment of HUCs:

The assessments of the Duck-Pensaukee watershed (04030103) and the Lower Fox River watershed (04030204) are based upon information gathered during:

- Baseline surface-water quality data compiled by the Oneida Environmental Quality Department in cooperation with U.S. Geological Survey.
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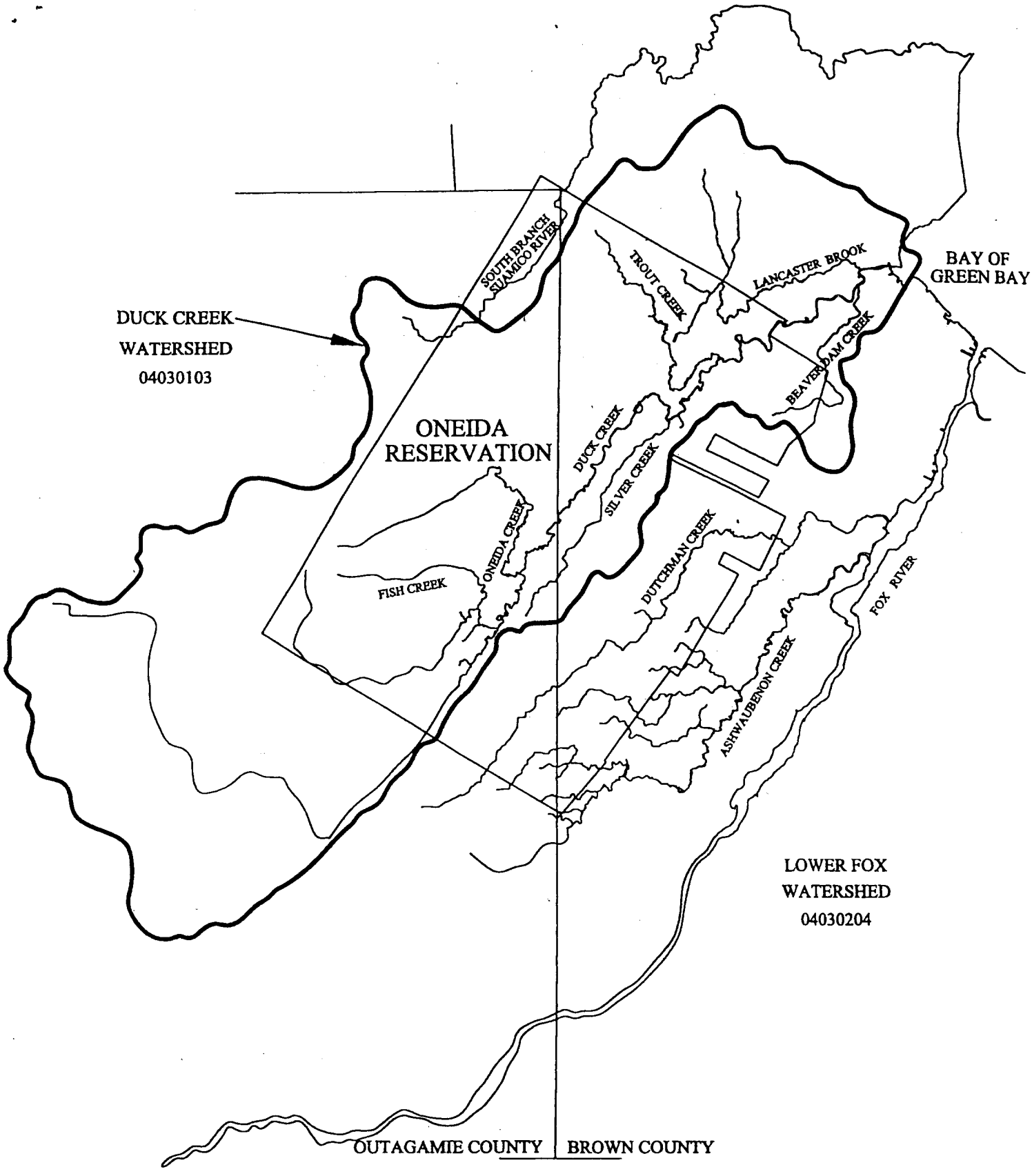
- Nonpoint source pollution assessments completed for the *Duck, Apple, Ashwaubenon Creeks Priority Watershed Project* by staff from the Oneida Environmental Planning Department, Brown and Outagamie County Land Conservation Departments (LCDs), and WDNR.
- Oneida Nation Water Quality Standards (Adopted July 17, 1996)

The following Tables present the categories and summaries for the HUC's in this assessment.



DUCK CREEK / LOWER FOX RIVER
WATERSHEDS

Category: 1	Needs Restoration			
		Duck-Pensaukee HUC-04030103		
Land Cover *	**Clean Water Act § 303(d) list ****	**Unique Water Resources**	**Existing Water Resources Mgt. Projects**	**Index of Watershed Indicators *****
75% agriculture 16% woodland/wetland 9% developed	Trout Creek Duck Creek • Nitrates, phosphorus, suspended solids all exceed national mean. • NPS, MUN, URBAN, DO, habitat, PCB, low flow	Duck Creek - spawning grounds for Great Lakes fish Lancaster Brook • brook trout population, naturally reproducing • Cold Water Ecosystem	- Priority Watershed Program (PWP) - Environmental Quality Incentives Program (EQIP) - NAWQA partner - NRDA co-trustee, Lower Fox River	3 - local conditions indicate more serious water quality problems • 3 indicates less serious water quality problems

* Cumulative watershed land use. Subwatershed percentages for agriculture, woodland/wetland, and developed are: Burma Swamp (78%, 13%, 9%); Fish Creek (82%, 9%, 9%); Trout Creek (77%, 18%, 5%); Lancaster Brook (37%, 13%, 50%).

** CWA § 303(d) list prepared by WDNR - This is not an endorsement of the state list by the Oneida Nation.

*** Although USEPA designates the IWI as '3', local conditions indicate watershed experiencing more serious water quality problems.

Category: 1	Needs Restoration			
		Lower Fox River HUC-04030204		
Land Cover *	**Clean Water Act § 303(d) ****	**Unique Water Resources**	**Existing Water Resources Mgt. Projects**	**Index of Watershed Indicators**
73% Agriculture 10% Woodland/ Wetland 17% Developed	Dutchmans Cr. • NPS, MUN, URBAN, DO, habitat, PCB, low flow • NH_3	Ashwaubenon & Dutchmans Creeks - spawning grounds for Great Lakes fish	- Priority Watershed Program (PWP) - Environmental Quality Incentives Program (EQIP) - NRDA co-trustee, Lower Fox River	6 • 6 indicates more serious water quality problems

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Watershed Restoration Priorities: **Nonpoint Source Pollution, Wetlands, Habitat.**

Duck Creek drains 155 square-miles of primarily agricultural land in east-central Wisconsin (*PWP, 1997*). It is generally a turbid, slow-moving stream draining farmlands that are primarily in corn production and pasture land for dairy cattle (*USGS, 1997*). Duck Creek discharges into lower Green Bay approximately two miles west of the mouth of the Fox River. Ashwaubenon Creek watershed drains approximately 113 square miles of suburban and agricultural land and discharge into the Fox River. Reductions in nutrients and suspended solids are the main priorities for watersheds within the Oneida Reservation. Wetland and habitat restoration are secondary goals. Watershed streams annually deliver 102,315 tons of suspended solids and 228,500 lbs. of phosphorus to lower Green Bay (*PWP, 1997*), amounting to more than twenty-five percent of the cumulative load of sediments and nutrients to the lower bay. Urban sprawl from adjacent municipal areas continues to affect watershed resources. The destruction of riparian and headwater wetlands for residential, commercial, and agricultural uses have contributed to increased peak flows and diminished mean flows in surface waters.

Increased sediment and nutrient loadings and the destruction of watershed wetlands have impaired the aquatic ecosystem and severely limited recreational opportunities for watershed residents. In response, the Oneida Nation has:

- developed a comprehensive plan to address land use issues within the Reservation,
- partnered with WDNR and County LCDs on a ten-year nonpoint pollution abatement program,
- worked with USGS and US Fish & Wildlife Service to evaluate and monitor the surface waters of the Reservation,
- completed a 2,000-acre subwatershed study with the US Army Corps of Engineers and the University of Wisconsin to address flooding issues,
- restored hundreds of acres of wetlands under the EQIP, PWP, and BIA *Circle of Flight* programs, and
- written and received a grant from the Wisconsin Coastal Zone Management Program to develop conservation subdivisions in partnership with Brown County and the Town of Hobart.

Conclusion

There exists great potential for future uses of watershed streams. The installation of best management practices, including restoration of riparian and headwater wetlands, will result in improvements in water quantity and quality. This will provide increased opportunities for fishing, canoeing, and swimming, while improving near water activities like hiking, hunting, picnicking, and wildlife observation. The Oneida Nation will continue to work with our local, state, and federal partners to improve and protect the natural environment of the Oneida Reservation and Northeast Wisconsin for our children, and our children's children. . .to the *Seventh Generation.*

For additional information contact: Ron Baba &/or Melissa Schmitz @ (920)497-5812

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ONEIDA TRIBE OF INDIANS OF WISCONSIN

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The Oneida UWA was developed in consultation and cooperation with the Wisconsin Department of Natural Resources (WDNR), U.S. Environmental Protection Agency (USEPA), U.S. Department of Agriculture (USDA), and the Bureau of Indian Affairs (BIA).

Jurisdictional Setting

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Physical Setting

The Duck and Ashwaubenon Creek watersheds rest, for the most part, on the dolomitic limestone of the Sinnipee group. Along many miles of its course the Duck Creek has cut through overlying glacial material into the limestone layer -- this may have resulted in some connectivity between surface and ground waters, potentially affecting surface flows. The watershed is characterized by gently rolling topography and silty-clayey till soils. The area has a modified continental climate. Mean annual precipitation averages twenty-nine inches.

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The following Tables present the categories and summaries for the HUC's in this assessment.

Category: 1	Needs Restoration			
		Duck-Pensaukee HUC-04030103		
Land Cover *	**Clean Water Act § 303(d) list ****	**Unique Water Resources**	**Existing Water Resources Mgt. Projects**	**Index of Watershed Indicators *****
75% agriculture 16% woodland/wetland 9% developed	Trout Creek Duck Creek · Nitrates, phosphorus, suspended solids all exceed national mean. · NPS, MUN, URBAN, DO, habitat, PCB, low flow	Duck Creek - spawning grounds for Great Lakes fish Lancaster Brook · brook trout population, naturally reproducing · Cold Water Ecosystem	- Priority Watershed Program (PWP) - Environmental Quality Incentives Program (EQIP) - NAWQA partner - NRDA co-trustee, Lower Fox River	3 - local conditions indicate more serious water quality problems · 3 indicates less serious water quality problems

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Category: 1	Needs Restoration			
		Lower Fox River HUC-04030204		
Land Cover *	**Clean Water Act § 303(d) ****	**Unique Water Resources**	**Existing Water Resources Mgt. Projects**	**Index of Watershed Indicators**
73% Agriculture 10% Woodland/ Wetland 17% Developed	Dutchmans Cr. · NPS, MUN, URBAN, DO, habitat, PCB, low flow · NH3	Ashwaubenon & Dutchmans Creeks - spawning grounds for Great Lakes fish	- Priority Watershed Program (PWP) - Environmental Quality Incentives Program (EQIP) - NRDA co-trustee, Lower Fox River	6 · 6 indicates more serio water quality problems

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Unified Watershed Assessment for the Reservation of the Oneida Tribe of Indians of Wisconsin

Compiled by Oneida Nation Environmental Quality
and Environmental Planning Departments
August, 1998

Introduction

The Unified Watershed Assessment (UWA) was prepared by the Oneida Nation, under guidelines contained in the Clean Water Action Plan (CWAP), to accelerate coordinated watershed restoration on the Oneida Reservation so as to achieve maximum resource benefits. The UWA describes the watershed, categorizes surface waters, and provides the framework for coordination with local, state, and federal partners to restore and protect water quality on the Oneida Reservation and in the Northeast Wisconsin region. The Oneida UWA was developed in consultation and cooperation with the Wisconsin Department of Natural Resources (WDNR), U.S. Environmental Protection Agency (USEPA), U.S. Department of Agriculture (USDA), and the Bureau of Indian Affairs (BIA).

The Oneida Nation in Wisconsin

The Oneida People came to Wisconsin in the early 1800's and settled along the Duck Creek. The 65,400-acre Oneida Reservation was established in 1838 by the Treaty of Buffalo Creek, ten years prior to Wisconsin statehood. Passage of the Indian Allotment Act of 1887, in concert with the often fraudulent methods used by local land companies to seize Indian-owned properties, resulted in the loss of all but a few hundred acres by 1924. A decade later, Congress passed the Indian Reorganization Act providing the foundation for the Oneida Constitution, the present Tribal governmental structure, and the reacquisition of Tribal lands within the Reservation. Over the years, the Oneida Tribe has gradually increased its land base to the nearly 12,000 acres owned today.

Jurisdictional Setting

The Oneida Reservation is located southwest of the city of Green Bay and west of the Fox River. At eight miles wide, and twelve miles in length, it is the fifth largest reservation in the State of Wisconsin. The Reservation straddles the boundaries of Brown and Outagamie County and lies within the 265-square-mile Duck and Ashwaubenon Creeks (D/A) watershed. Incorporated areas in the watershed include: the cities of Green Bay and De Pere; the villages of Ashwaubenon and Howard; and the towns of Freedom, Hobart, Lawrence, Pittsfield, Oneida, Suamico, Seymour, and Wrightstown. The population of the watershed is approximately 64,676 persons. Regional trends indicate that the population will continue grow over the next twenty years. Planned growth is considered significant in most subwatershed drainage areas where it varies from 35 to 100 percent. Portions of smaller streams such as Lancaster Brook, Silver Creek, Trout Creek and the tributaries of Duck Creek are experiencing the most significant development pressures at this time.

Agricultural land uses dominate the watershed, comprising fifty-eight percent of the land area. Dairy farming is the primary enterprise, with the average farm being 175 acres in size. Woodlands and wetlands comprise twenty percent of the watershed and are generally scattered 5-to-40 acre lots, with the exception of much larger forested areas in the Burma Swamp and Trout Creek subwatersheds. Developed land uses account for the remainder of the watershed.

Summary of Land Uses in the Duck, Apple and Ashwaubenon Creeks Watershed

Land Use	Acres	Percent
Agricultural	99,327	52
pasture	(993)	(1)
cropland	(98,334)	(57)
Grassland/Woodland	21,251	12
Rural Developed	15,039	9
Wetland	12,852	8
Developed/Urban	21,441	13
Total	169,910	100

Source: Oneida Nation, Brown County, Outagamie County, WDNR.

Physical Setting

Climate and Precipitation

The D/A watershed lies in the continental zone within the Great Lakes basin. Local climate is characterized by long and relatively cold winters and summers which are mostly warm with periods of hot humid conditions. Mean annual precipitation within the watershed averages twenty-nine inches, most of which results from thunderstorms during the growing season (May-September) and winter snow storms. Runoff occurs primarily during the Spring melt, when the land surface is frozen and soil moisture content is highest.

Geology

The D/A watershed rests on the back slope of the Sinnipee limestone group. The Sinnipee group consists of a dolomitic limestone layer, 10-310 feet in thickness. Along many miles of its course the Duck Creek has cut through overlying material and exposed this formation. The Sinnipee Dolomite may allow water to flow into older underlying layers which form the water table.

Cambrian sandstones (Trempeleau, Tunnel City, and Elk Mound groups), provide the major aquifers underlying the watershed. These are fine-to-coarse grained well-cemented units found 500 to 700 feet below the surface. Additional Ordovician sandstones immediately under the Sinnipee Dolomite group may be found approximately 125 feet beneath Duck Creek. Total thickness of all these sandstone aquifers is about 600 feet within the watershed. The oldest bedrock can be encountered 725 feet beneath the surface in the northeastern portion of the watershed.

Topography

Topography and surface drainage patterns within the watershed have been strongly influenced by glaciation. The most recent glacial advance, the Wisconsin stage, lasted some 60,000 years ending around 9,000 years ago. Glaciers during the last advance deposited large quantities of glacial debris in the northern portion of the watershed near the confluence of the Duck and Trout Creeks producing the sandy soils and parent material present today. Deposits of till high in red clay are scattered over the older glacial deposits. The Valders advance (the most recent), with its deposition of red clay, gave the watershed its gently rolling topography and provided very productive agricultural soils. Various sand-silt-clay mixes account for the variety and productivity of loam soils.

The elevation of the watershed varies from a high of 850 feet about a mile southeast of the Village of Black Creek to 585 feet near the mouth of the Duck Creek. The southern portion of the watershed is characterized by flat to gently rolling topography. Within the Oneida Reservation the landscape is interrupted by two glacial moraine ridges flanking Duck Creek, and the rugged ravines of the Trout Creek area. Local relief is characterized by dendritic drainage patterns where the streams have succeeded in cutting into glacial land forms.

Soils

Due to the watershed's location within two counties, two distinct sets of soil associations and maps exist for the watershed. The most recent information on Brown County soils was compiled in June of 1974 while the Outagamie County soils survey dates from 1978. Both counties are presently updating their soil surveys.

Brown County -- This portion of the watershed is dominated by two soil associations, the Shawano-Boyer-Sisson and Oshkosh-Manawa. The Shawano-Boyer-Sisson group, located within the valleys and ravines of the Duck and Trout Creeks, is characterized by deep, excessively drained and well drained soils varying from nearly level to steep. Typically sandy or sandy loams, these soils are often located on outwash plains and ridges and glacial lake plains. The Oshkosh-Manawa association are deep, well drained to somewhat poorly drained with clayey or sandy subsoils. Varying from nearly level to steep, they are found on glacial lake plains dissected by narrow V-shaped valleys. Within this watershed, the Oshkosh-Manawa group is found along the west bank of the Fox River. In addition, three smaller soil combinations exhibiting various drainage and topographic characteristics are found within Brown County's portion of the watershed.

Outagamie County -- Two groups, the Hortonville-Symco and Winneconne-Manawa associations, cover nearly eighty percent of the watershed within Outagamie County. Hortonville-Symco soils are well drained and somewhat poorly drained and vary from nearly level to steep in gradient. Ranging from medium to coarse in texture, this group is moderately permeable and is usually underlain by calcareous or clay loam glacial till. This association if found mainly west and north of the Duck Creek. The Winneconne-Manawa association shares similar characteristics with the before mentioned Hortonville-Symco,

however, it is generally slowly permeable underlain by silty clay glacial till or lacustrine sediments. In addition, three smaller soil combinations exhibiting various drainage and topographic characteristics are found within Outagamie County's portion of the watershed.

Hydrologic Setting

The D/A is the primary watersheds draining the Reservation. A small portion of the northwest corner of the Reservation (est. 2,100 acres) drains to the south branch of the Suamico River. The watershed encompasses a 265 square mile drainage basin located in Northeastern Outagamie County and west central Brown County and includes the majority of the Oneida Nation reservation. Outagamie County accounts for 62 percent (170 square miles) of the land area within the watershed. The remaining 38 percent (95 square miles) falls within Brown County. The watershed includes more than two-hundred miles of first, second, and third order streams. Most are in a degraded or degrading condition.

The D/A is a subwatershed of the 6,635 square mile Fox/Wolf River basin, the largest natural drainage system of Lake Michigan. It represent less than five-percent of the total land area within the basin, yet contribute more than twenty-five percent of the total nonpoint source loading to lower Green Bay (*Northeast Wisconsin Waters for Tomorrow, 1988*). The D/A was selected as a Priority Watershed Project (PWP) under the Wisconsin Nonpoint Source Abatement Program, and was chosen for funding under the United States Department of Agriculture Environmental Quality Incentives Program.

Streams

Streams and wetlands are the predominant surface water features in the watershed. Perennial streams, with a combined length of approximately one hundred eighty-eight (188) miles, maintain at least a small continuous flow throughout most of the year. The Duck Creek, at 42 miles, is the longest perennial stream in the watershed. The waterway served as the axis around which the Reservation was surveyed in 1838, and is viewed by many Tribal members as the most culturally significant geographic feature of the Oneida Reservation. Other primary streams include Dutchmans Creek (17 Miles), and Ashwaubenon Creek (15 miles).

While the majority of the Duck Creek Watershed supports a warm water fishery, portions of Trout Creek and Lancaster Brook have been classified as cold water ecosystems in the Oneida Nation Water Quality Standards. The entirety of the Ashwaubenon Creek Watershed is classified as a warm water ecosystem.

Streams within the D/A are not reaching their highest potential use due to pollution from nonpoint sources. Sedimentation and phosphorus loading from upland agricultural fields are the major sources of nonpoint pollution in the watershed. These upland areas contribute well over eighty percent of the overall load. Eroding streambanks and improperly managed livestock operations are also contributors. In addition, land use changes in riparian and upland areas along with the

destruction of nearly seventy percent of the area's historical wetlands have led to the 'flashy' characteristics exhibited by area streams. Consistently low summer water levels and periods of 'no flow' play a major role in limiting aquatic life throughout the watershed.

Hydrologic Unit Codes

All surface waters of the Reservation drain to the Great Lakes Basin (Lake Michigan), and correspond to the following hydrologic unit codes (HUC):

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Land Cover **	**Clean Water Act § 303(d) list ***	**Outstanding Tribal Resource Waters**	**Existing Water Resource Management Projects**	**Index of Watershed Indicators *****
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* CWA § 303(d) list provided by WDNR

** Land cover percentages represent cumulative watershed land uses. Subwatershed percentages for agricultural, woodland/wetland, and developed are: Burma Swamp (78%, 13%, 9%); Fish Creek (82%, 9%, 9%); Trout Creek (77%, 18%, 5%); Lancaster Brook (37%, 13%, 50%).

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Category: 1	Restoration			
		Lower Fox River HUC-04030204		
Land Cover	**Clean Water Act § 303(d)**	**Outstanding Tribal Resource Waters**	**Existing Water Resource Management Projects**	**IWI Score**
73% Agriculture 10% Woodland/ Wetland 17% Developed	Dutchmans Cr. • NH_3	none	- Priority Watershed Program (PWP) - Environmental Quality Incentives Program (EQIP) • Apple and Ashwaubenon Creeks	6 6 indicates more serious water quality problems

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** Land cover percentages represent cumulative watershed land uses. Subwatershed percentages for agriculture, woodland/wetland, and developed are: Ashwaubenon Creek (75%, 12%, 13%); Dutchmans Creek (70%, 7%, 23%).

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Nonpoint Source Pollution, Wetlands, Habitat.

Duck Creek drains 155 square-miles of primarily agricultural land in east-central Wisconsin (*PWP, 1997*). It is generally a turbid, slow-moving stream draining farmlands that are primarily in corn production and pasture land for dairy cattle (*USGS, 1997*). Duck Creek discharges into lower Green Bay approximately five miles west of the mouth of the Fox River. Ashwaubenon Creek drains approximately 113 square miles of suburban and agricultural land and discharges into the Fox River. Reductions in nutrients and suspended solids are the main priorities for watersheds within the Oneida Reservation. Wetland and habitat restoration are secondary goals. Watershed streams annually deliver 102,315 tons of suspended solids and 228,500 lbs. of phosphorus to lower Green Bay (*PWP, 1997*). Additional nonpoint pollutants include:

- median nitrate concentrations in Duck Creek more than twice the national mean concentration for agricultural areas (~1.55 mg/L);
- nitrate concentrations in the north branch of Ashwaubenon Creek in excess of 70 mg/L;
- median phosphorus concentrations exceeding USEPA limits to discourage excessive biotic growth in flowing water (0.1 mg/L);
- detections of atrazine in all Reservation surface waters; and,
- high concentrations of commercial agricultural pesticides.

Urban sprawl from adjacent municipal areas continues to affect watershed resources. Polychlorinated biphenyls (PCBs), DDT, and heavy metals have been detected at high levels in the tissue of fish and the stream bed of Duck Creek (levels of mercury and selenium found in the livers of rock bass were the highest found among all biota in the Western Lake Michigan NAWQA study). The destruction of riparian and headwater wetlands for residential and commercial development have led to increased peak flows and diminished year-round flows within surface waterways.

Increases in sediment and nutrient loadings and the destruction of watershed wetlands have impaired the aquatic ecosystem and severely limited recreational opportunities for watershed residents. In response, the Oneida Nation has:

- developed a comprehensive plan to address land use issues within the Reservation;
- partnered with WDNR and County LCDs on a ten-year nonpoint pollution abatement program;
- worked with USGS and US Fish & Wildlife Service to evaluate and monitor the surface waters of the Reservation;
- completed a 2,000-acre subwatershed study with the US Army Corps of Engineers and the University of Wisconsin to address flooding issues;
- restored hundreds of acres of wetlands under the EQIP, PWP, and BIA *Circle of Flight* programs; and,
- written and received a grant from the Wisconsin Coastal Zone Management Program to preserve open space in residential development projects in partnership with Brown County and the Town of Hobart.

Water Resource Conditions

Surface Waters

For the purposes of this assessment, the D/A watershed is subdivided into individual subwatersheds. Each subwatershed conveys surface water from the Duck and Ashwaubenon Creek watersheds to lower Green Bay and the Fox River, respectively.

The following tables highlight water resource conditions, goals, and objectives for the Duck and Ashwaubenon watersheds.

Surface Water Resource Conditions, Goals and Objectives for the Duck and Ashwaubenon Creeks Watershed

SUBWATERSHED	STREAM NAME	LENGTH (MILES)	EXISTING BIOLOGICAL USE & MILES	LIMITING FACTORS	OBSERVED &POTENTIAL SOURCES	SURFACE WATER RESOURCE GOALS	SURFACE WATER RESOURCE OBJECTIVES
Burma Swamp	Duck Creek	30 - 42	WWE (Oneida) WWSF / 2 (Wis.) WWFF / 10 (Wis.)	SED, NUT HAB, DO FLOW, TEMP	NPS-PSB, CON, BY, CL, URB, DCH	-Improve aquatic life habitat and water quality -Reduce sediment and nutrient loading -Increase stream baseflow	-Maintain, enhance and create buffers -Promote Ag BMP's -Promote alternatives to tiling and ditching -Limit livestock access to the stream -Improve infiltration
Fish Creek	Duck Creek	6 - 30	WWE (Oneida) WWSF (Wis.)	SED, NUT, HAB, DO, FLOW, TEMP	NPS-PSB, CON, BY, CL, URB, DCH	-Improve aquatic life habitat and water quality -Increase stream base flow -Enhance wildlife habitat -Reduce sediment and nutrient loading	-Maintain, enhance and create buffers -Restrict livestock access to the stream -Control construction site erosion -Promote good Ag BMP's -Maintain, enhance and create wetlands -Decrease sedimentation of spawning areas -Promote alternatives to tiling and ditching -Encourage good land use planning
Trout Creek	Trout Creek	8	CWE (Oneida) WWFF (Wis.)	SED, NUT, HAB, DO, FLOW	NPS-PSB, CON, BY, CL	-Improve aquatic life habitat and water quality -Increase stream baseflow -Enhance wildlife habitat -Reduce sediment and nutrient loading	-Maintain, enhance and create buffers -Control construction site erosion -Maintain, enhance and create wetlands -Encourage good land use planning -Decrease sedimentation of spawning areas -Preserve the habitat of the redside dace and the wood turtle -Promote Ag BMP's
Lancaster Creek	Duck Creek Lancaster Creek Beaver Dam Creek Unn. Creek (T24N,R20E,S10) Unn. Creek (T25N,R20E,S36) Unn. Creek (T25N,R20E,S34)	0 - 6 8 4 2 6 1	ORW (Oneida) WWSF (Wis.) WWE (Oneida) WWFF / 4 (Wis.) WWE (Oneida) WWE (Oneida) WWE (Oneida)	SED, NUT, HAB, DO, FLOW	NPS-PSB, CON, BY, CL, URB	-Improve aquatic life habitat and water quality -Increase stream baseflow -Enhance wildlife habitat -Reduce sediment and nutrient loading	-Maintain, enhance and create buffers -Control construction site erosion -Maintain, create and enhance wetlands -Encourage good land use planning -Decrease sedimentation of spawning areas -Promote Ag BMP's -Decrease sedimentation of spawning areas

Surface Water Resources Conditions, Goals and Objectives for the Duck and Ashwaubenon Creeks Watershed

SUBWATERSHED	STREAM NAME	LENGTH (MILES)	EXISTING BIOLOGICAL USE (MILES)	LIMITING FACTORS	OBSERVED OR POTENTIAL SOURCES	SURFACE WATER RESOURCE GOALS	SURFACE WATER RESOURCE OBJECTIVES
Hemlock	Ashwaubenon Creek	15	WWE (Oneida) WWSF / 7.5 (Wis.) WWFF / 7.5 (Wis.)	SED, NUT, HAB, DO, FLOW, TEMP	NPS-PSB, CON, BY, CL, URB, FLOW	-Improve aquatic life habitat and water quality -Increase stream baseflow -Enhance wildlife habitat -Reduce sediment and nutrient loading	-Maintain, enhance and create buffers -Restrict livestock access to the stream -Control construction site erosion -Encourage land use planning -Maintain, enhance and create wetlands -Decrease sedimentation of spawning areas -Promote Ag BMPs
	Hemlock Creek	7	WWE (Oneida)				
	North Branch Ashwaubenon Cr.	7	WWE (Oneida)				
	South Branch Ashwaubenon Cr.	6	WWE (Oneida)				
	Unn. Creek (T23N,R20E,S21)	4	WWE (Oneida)				
	Unn. Creek (T23N,R20E,S31)	2	WWE (Oneida)				
	Unn. Creek (T22N,R20E,S06)	3	WWE (Oneida)				
	Unn. Creek (T22N,R19E,S12)	1	WWE (Oneida)				
	Unn. Creek (T22N,R19E,S12)	2	WWE (Oneida)				
	Unn. Creek (T22N,R19E,S11)	2	WWE (Oneida)				
Dutchman	Dutchman Creek	0 - 17	WWE (Oneida) WWSF / 4 (Wis.) WWFF / 13 (Wis.)	SED, NUT, HAB, NH3, FLOW, DO, TEMP	NPS-PSB, CON, BY, CL, URB, FLOW	-Improve aquatic life habitat and water quality -Increase base stream flow -Enhance wildlife habitat -Reduce sediment and nutrient loading	-Maintain, enhance and create buffers -Restrict livestock access to the stream -Control construction site erosion -Promote Ag BMP's -Maintain, enhance and create wetlands -Decrease sedimentation of spawning areas -Encourage good land use planning
	Unn. Creek (T23N,R20E,S09)	2	WWE (Oneida)				
	Unn. Creek (T23N,R20E,S09)	3	WWE (Oneida)				

Biological Use, Existing - indicates existing biological uses supported by the stream as defined in the Oneida Nation Water Quality Standards and the Wisconsin Department of Natural Resources NR 102 (04)(3) under fish and aquatic life uses.

ORW	Outstanding Resource Water (Oneida)
CWE	Cold Water Ecosystem (Oneida)
WWE	Warm Water Ecosystem (Oneida)
COLD	coldwater communities (WDNR)
WWSF	warmwater sport fish communities (WDNR)
WWFF	warmwater forage fish communities (WDNR)
LFF	limited forage fishery (WDNR)

Limiting Factors

HAB	Habitat (lack of cover, sedimentation scouring etc.)
SED	Sedimentation (filling in of pools)
TEMP	Temperature (extreme high for trout)
DO	Dissolved Oxygen (to low)
FLOW	Flooding or fluctuating water levels
ALG	Algae (abundant)
NUT	Nutrient enrichment
TURB	Turbidity
BAC	Bacteria (MMFCC/100 ml)

Observed or Potential Sources

NPS	Unspecified nonpoint sources
CL	Cropland erosion
SL	Shoreline erosion
SB	Streambank erosion
PSB	Streambank pasturing
BY	Barnyard or exercise lot runoff
PSM	Point source, municipal treatment plant discharge
PSI	Point source, industrial discharge (rotten granite pit dewatering)
NMM	Non-metallic mining (rotten granite/gravel)
UR	Urban runoff
CON	Construction site erosion
DCH	Ditching

Point source discharges in Duck and Ashwaubenon Watershed

FACILITY NAME	PERMIT #	RECEIVING WATER	CLASS	ACTIVITIES
Anamax	?	Beaver Dam Creek	WWE	
Ebben Quarry	0046515-2	Dutchman Creek	WWE	Individual
Fabco Equipment	0046612 000930	Ashwaubenon Creek	WWE	Individual
Freedom Elementary School	0030384	Duck Creek	WWE	Municipal
Freedom Sanitary District #1	0020842 980930	Duck Creek	WWE	Municipal
New Harvest Foods, Inc.	0045080 960930	Groundwater to Duck Creek wtrshed		Individual
Oneida Sewage Lagoon - Site 2	?	Oneida Creek	WWE	Tribal
Provimi, Inc.	0044628 010630	Tributary to Duck Creek	WWE	Individual
Quarry (Village of Howard)	?	Tributary to Lancaster Brook	CWE	Individual
Sanger B. Powers Correctional Facility	0061221 001231	Groundwater to Trout Creek wtrshed		State
Schroeders Greenhouse	?	Tributary to Fish Creek	WWE	Individual
Super Value Stores, Inc.	0043923 8921231	Dutchmans Creek	WWE	Individual
Twelve Corners Cheese Factory	0030384	Duck Creek	WWE	Individual

In addition to the sites identified within the preceding table, numerous other facilities with the potential to impact surface waters exist within the watershed. They include: Brown County Landfill (HWY 54), Fort James sludge lagoons (HWY 172), Old Ashwaubenon Landfill, Austin Straubel International Airport, Green Acres Greenhouse (HWY U), and Mayflower Greenhouse (HWY 172).

Subwatershed Descriptions and Rural Pollutant Sources

Burma Swamp Subwatershed

The Burma Swamp Subwatershed consists of Duck Creek from its headwaters to approximately

one-quarter mile south of Center Valley Road near the town of Freedom. This 12.8 mile stretch of Duck Creek drains 49.6 square miles of land. Duck Creek is identified as the only perennial stream in the subwatershed and is classified as a warm water forage fishery (*WDNR, 1997*). In summer, this section of Duck Creek and its tributaries are normally dry. Flow occurs only after rain events. According to long-time residents of the town of Freedom, this is a common occurrence. One 30-year resident could remember only 3 years in which Duck Creek flowed throughout the summer.

Burma Swamp Subwatershed Land Uses	
Agriculture	78%
Wetland/Woodland	13%
Developed	9%

Surface Water Resource Conditions

The existing conditions of the surface water in this subwatershed were difficult to determine due to the lack of water during most of the monitoring season. From mid-June through mid-August of 1995 no flow was observed in Duck Creek at Highway 55 (the farthest downstream road crossing in this subwatershed). Ponded areas did exist upstream of Highway 55 and they were characterized by low dissolved oxygen and turbid water. Bullheads and rusty crayfish were the only aquatic life observed.

Stream habitat ratings indicate "fair" water quality at County Highway S. Dissolved oxygen was monitored on August 29 through September 13, 1995 at County Highway S, west of Freedom. In general, oxygen concentrations were good, only rarely dropping below 5 mg/l. Fishery resources are limited to species that migrate upstream from perennial portions of Duck Creek and species that can tolerate low dissolved oxygen levels. If water flowed into early June, northern pike would be able to spawn and have good recruitment of the young (*WDNR Fish Management Report, 1995*),

Streambank buffers are rare; livestock pasturing and farming practices occur up to the stream in many cases. Stream substrate is composed primarily of soft sediment though some in-stream habitat does exist, usually in areas of higher velocity where scouring occurs. Drainage channels in the subwatershed causes stream flashiness and dramatic water fluctuations. The lack of flow year-round is the limiting factor in this subwatershed; however, when water is present, better habitat and water quality is attainable if sediment and nutrient loading were reduced. Stream ditching and warm water temperatures prevent the resource from meeting its potential.

Rural Nonpoint Source Pollutants

- The Burma Swamp Subwatershed contains 77 animal lots which contribute 2052 pounds of organic phosphorus, representing an estimated 23 percent of the phosphorus load from barnyards to the D/A watershed.

- Upland sediment delivery is 22,139 tons, or 23 percent of the annual load to the D/A watershed. Cropland contributes 98% of the total sediment load.
- Four percent of the sediment delivered from streambanks in the D/A watershed originates in the Burma Swamp Subwatershed.

Fish Creek Subwatershed

The Fish Creek Subwatershed contains a portion of Duck Creek and 30 miles of unnamed tributaries draining 53.3 square miles of land. Duck Creek is the only perennial stream in the subwatershed and is classified as a warm water ecosystem. All of the tributaries are intermittent, none are classified.

Fish Creek Subwatershed Land Uses	
Agriculture	82%
Wetland/Woodland	9%
Developed	9%

Surface Water Resource Conditions

The condition of surface water resources of the Fish Creek Subwatershed were difficult to ascertain due to dry conditions during summer. Duck Creek can be characterized as a string of stagnant pools separated by dry streambed. The creek flows sluggishly through this subwatershed, even during periods of high precipitation. Streambank buffering is sparse and bank erosion is common. Substrate is composed primarily of soft sediment, though significant areas of bedrock exist. The stream is turbid and carries a large load of suspended material.

Limited numbers of northern pike and smallmouth bass were found in this subwatershed. Their occurrence peaked nearest to the mouth of Duck Creek and rapidly decreased farther upstream. Forage minnow species were also present. Habitat evaluations for the subwatershed ranked Duck Creek from "fair" to "good". HBI results from Center Valley Road rated this stream segment as "good" in October, 1994 and "excellent" in April, 1995. The data suggest that the change in the HBI result from fall to spring was due to the presence of *Prosimulium mysticum*, a relatively intolerant Dipteran. EPT values for this reach were 81 percent in October and 1 percent in April. Dissolved oxygen was monitored from June 13 through June 26, 1995 at Center Valley Road and from June 12 through June 20, 1995 at CTH FF. Both runs showed classic diel (24-hour) dissolved oxygen swings, indicating high primary production, or photosynthesis, during the day and high respiration rates at night. Low dissolved oxygen levels combined with high water temperatures are significant stressors of aquatic life in the subwatershed.

Triazine monitoring was conducted at the USGS gauge station located at CTH FF. Triazine samples ranged in value from 0.1 to 0.8 ppb. Triazine levels greater than 6 ppb have been found to reduce algae growth (*LaLiberte, 1984*).

Water chemistry sampling at CTH FF was conducted by students from UW-Green Bay to compare urban and rural concentrations and loadings of phosphorus and suspended solids to the stream. The samples were analyzed for suspended solids, ortho-phosphorus and total phosphorus and combined with flow data to determine loadings. Of the first three monitored runoff events of the year, concentrations and loads were highest during the first two events (*University of Wisconsin-Green Bay, May 1995*). Duck Creek would benefit from reduced sedimentation in pools and riffles and stabilized streambank and flow conditions. Low stream flow and high water temperatures in summer do not provide habitat and water quality adequate to support most aquatic life. High nutrient loadings must be reduced in order to limit algae growth and stabilize dissolved oxygen levels.

Rural Nonpoint Source Pollutants

- The Fish Creek subwatershed contains 52 animal lots which annually contribute 1,367 pounds of organic phosphorus representing an estimated 15 percent of phosphorus loads from barnyards to the D/A watershed.
- Annual upland sediment delivery in the Fish Creek subwatershed is 18,430 tons, or 19 percent of the entire watershed load; cropland is the major source in this subwatershed, contributing 98 percent of the load

Trout Creek Subwatershed

The Trout Creek Subwatershed consists of the main stem of Trout Creek and a number of small unnamed intermittent tributaries. The perennial portion of Trout Creek is 8 miles long and drains 19.5 square miles of land. Trout Creek is classified as cold water ecosystem (WDNR classifies as a warm water sport fishery) with some history of a marginal trout fishery (*Surface Water Resources of Brown County, 1972*).

Trout Creek Subwatershed Land Uses	
Agriculture	77%
Wetland/Woodland	18%
Developed	5%

Surface Water Resource Conditions

Trout Creek was one of the few streams in the watershed to experience good flow throughout the year. This may be due to the prevalence of sandy soils in northern Brown County. These soils allow water to infiltrate and move through the ground easier than the heavy clay soils to the south. The lower and main stem reaches have relatively steep topography, are well buffered by woodlands, and have few nonpoint source impacts. The headwaters originate in areas with more gentle topography, poor buffering, and evidence of agricultural nonpoint problems. The substrate is composed primarily of soft sediment, though gravel, rubble and boulders are also present.

Three of four habitat evaluations conducted on Trout Creek ranked the stream as "fair", the other "poor". HBI's conducted at Western Drive indicated "good" water quality both in October 1994 and April 1995. EPT values were 83 percent and 38 percent, respectively. Dissolved oxygen readings taken at Trout Creek Road from July 12 through July 26, 1995 showed dissolved oxygen swings and standards violations. It is likely that intolerant aquatic life is stressed in this section of the stream. The fishery of Trout Creek is composed of the redside dace (a state-threatened species), white suckers, johnny darters and other forage species. It is unlikely that a resident or native population of trout exists. Presumably other species like northern pike and perch migrate out of Duck Creek to spawn and feed.

Two areas on Trout Creek were used as IBI reference site locations for the Sheboygan River Priority Watershed Study: 90 meters downstream of Trout Creek Road ("fair" rating) and 179 meters downstream from Brookwood Drive ("poor" rating) (*Fish Station Summary, 1995*). Water chemistry samples were collected from Trout Creek at CTH J after spring snow melt and two other runoff events. The snow melt sample was taken on March 14, 1995. The only parameter having a high reading was suspended solids (78 mg/l). The next sample was taken on April 19, 1995 and showed very high levels of suspended solids (138 mg/l). The last sample was taken on August 9, 1995 and showed no exceedingly high values.

Trout Creek would benefit from reduced sedimentation and nutrient loading , especially in the upper reaches of the subwatershed. Providing a buffer of vegetation along the stream in these sections would help improve overall water quality and aquatic life habitat.

Rural Nonpoint Source Pollutants

- The Trout Creek Subwatershed contains 12 animal lots which annually contribute 366 pounds of organic phosphorus. This represents an estimated 4 percent of the phosphorus load from barnyards for the entire watershed.
- Upland sediment delivery in the Trout Creek Subwatershed is 4,648 tons annually, or 5 percent of the total load to the D/A watershed. Cropland is the major sediment source in the subwatershed, contributing 98 percent of the load.
- Fourteen percent of the sediment delivered from streambanks in the watershed originates in the Trout Creek subwatershed.

Lancaster Brook Subwatershed

The Lancaster Brook Subwatershed consists of Lancaster Creek, Beaver Dam Creek, a portion of Duck Creek, and three unnamed tributaries. Twenty-three miles of stream drain 29.8 square miles of land. Duck Creek, Beaver Dam Creek and Lancaster Creek are all perennial streams. Duck Creek is classified as a warm water ecosystem (WDNR classifies as warm water sport fishery); Beaver Dam Creek is also classified as a warm water ecosystem (WDNR classifies as a warm water forage fishery). Lancaster Creek is classified as a cold water ecosystem (unclassified by WDNR).

Lancaster Brook Subwatershed Land Uses	
Agriculture	37%
Wetland/Woodland	13%
Developed	50%

Surface Water Resources Conditions

Surface water resource conditions were much better compared with the other subwatersheds due to the presence of water throughout the summer. Aquatic life in these streams is dependant on lower Green Bay and the main stem of Duck Creek for refuge when water quality conditions in the streams are poor .

Through the Water Action Volunteer Program, students from Southwest High School monitored Lancaster Creek. Students assigned each sample a Water Quality Rating (WQR) based on the number and type of aquatic insects collected. Samples were taken at Meadowbrook Park in the village of Howard (Oct, 1995). Twenty one samples were collected: five indicated "good " water quality; fourteen were "fair"; and, two showed "poor" water quality. Other participants in the Water Action Volunteer Program monitored Duck Creek at Pamperin Park from fall, 1991 to spring, 1995. During that time, the Water Quality Rating dropped from good to medium. The WQR fell from good to barely fair at Brown County Park, and fell from excellent to fair at Pamperin Park over the sampling period. (*Water Action Volunteer Program, 1994-1995 Progress Report*)

In the early 1980's, fish surveys were conducted on Thornberry Creek (tributary to Lancaster Creek), located in the headwater area south of HWY 29/32 and west of CTH FF. At that time, a resident population of brook trout were found. No surveys have been completed since that time (*Northeast Region Fish Management Files, 1995*). Monitoring in Lancaster Creek produced "fair" to "poor" habitat ratings. HBI values taken at Glendale Avenue indicated "good" water quality in both spring and fall , 1995. EPT values were 12 percent and 23 percent, respectively. Dissolved oxygen levels at STH 29/32 from June 27 through July 11, 1995 rarely fell below the state standard and were sufficient to support intolerant aquatic life.

An IBI transect was developed on Lancaster Creek at the first bridge crossing downstream from STH 29/32. Eleven species were discovered, with the most common being creek chubs, longnose dace and johnny darters. The overall warmwater IBI rating was "fair" (*Cochran, 1996*).

Beaver Dam Creek is almost entirely located within an urban setting. It starts as an intermittent drainage near Southwest High School and meanders its way north until it hits Duck Creek near Velp Avenue. The stream is very flashy and carries a considerable sediment load. Substrate is made up of gravel, cobble and some soft sediments.

Surface Water Conditions

Beaver Dam Creek had a "fair" habitat rating below Memorial Drive. Macro invertebrates collected in October 1994 rated water quality as "poor". In April 1995, water quality was rated as "fairly poor". EPT values at this site were 0% for both sampling times indicating that none of the insects collected were in the Ephemeroptera, Plecoptera, or Tricoptera orders. Dissolved oxygen monitoring took place at Memorial Drive August 29 - September 20. Oxygen levels in Beaver Dam Creek never fell below 6 mg/l.

Beaver Dam Creek has a history of fish kills occurring every 2 to 3 years since the 1970's. They have been caused by ammonia spills, discharges of blood (very high BOD) from a rendering plant, and other, mostly industrial, practices. Fish kills are not normally severe in Beaver Dam Creek since there are few resident fish present. No fish surveys have been conducted in Beaver Dam Creek, though it is presumed that any fish living in Duck Creek can travel up Beaver Dam Creek. An IBI run was conducted on Beaver Dam Creek at Firemans Park. Six species were found, with creek chubs and johnny darters being the most common. The overall warmwater IBI rating for this site was "poor" (*Cochran, 1996*).

An interesting note on Beaver Dam Creek is that the Surface Water Resources book of Brown County (1972) states that, "[the creek] flows through pasture and agricultural land and cattle are causing considerable damage to the banks of this stream". In 23 years Beaver Dam Creek has changed from primarily an agriculturally impacted stream to an urban affected stream. Water chemistry samples taken during three runoff events at Memorial Drive in Green Bay all showed increased levels of suspended sediments, nitrates and total phosphorus. A number of sewers drain into Beaver Dam Creek and have a tremendous impact on the water quality. Beaver Dam Creek at Memorial Drive was sampled once in 1993 and several times in 1994 as part of a statewide Cryptosporidium spp. and Giardia spp. monitoring effort. In addition to the two protozoans, turbidity, suspended solids and E. coli bacteria were also monitored. (*DNR PUBL-WR429-95, August 1995*).

With the potential for the human population in this subwatershed to grow rapidly in the next few years, a stormwater management plan should be in place, as well as a plan to control growth and protect aquatic life habitat and water quality. The land use change from agriculture to residential/urban will stress not only the land, but the aquatic ecosystem as well.

Rural Nonpoint Source Pollutants

- The Lancaster Creek Subwatershed contains 3 animal lots which contribute 81 pounds of phosphorus [organic], annually, representing an estimated one percent of the phosphorus from barnyards to the D/A watershed.
- Annual upland sediment delivery in the Lancaster Creek Subwatershed is 5,457 tons, or 6 percent of the entire watershed load. Cropland is the major source in this subwatershed, contributing 98 percent of the load.
- The Lancaster Creek Subwatershed delivers one percent of the sediment from streambanks to the D/A watershed.

Hemlock Creek Subwatershed

The Hemlock Creek Subwatershed is made up of the main stem and north and south branches of Ashwaubenon Creek, Hemlock Creek, and six unnamed tributaries. Forty-nine miles of stream drain 29.4 square miles of land. The main stem of Ashwaubenon Creek is perennial; the remaining waterways are intermittent. Ashwaubenon Creek and its tributaries are classified as warm water ecosystems. In this subwatershed rural land practices contribute to surface water problems by causing streambank erosion, organic loading and sedimentation. Low stream flow during critical mid-summer periods stress aquatic life. Also a problem is the loss of stream habitat due to livestock grazing in the stream. Urban land use contributes sediment, nutrients, heavy metals (lead, copper and zinc), pesticides and organic contaminants (PAHs, VOC) (*Bannerman, 1990*).

Hemlock Creek Subwatershed Land Uses	
Agriculture	75%
Wetland/Woodland	12%
Developed	13%

Surface Water Resource Conditions

A lack of water during most of monitoring season inhibited investigators' determination of surface water conditions in this watershed. However, sufficient water was present in early and late summer to collect water quality data. Habitat ratings for Ashwaubenon Creek ranged from "fair" at CTH F to "poor" at Grant Street. The HBI results at Grant Street indicated "fairly poor" water quality in Fall, 1994 and "poor" water quality in Spring, 1995. EPT values were 22 percent in fall and 5 percent in spring. A continuous dissolved oxygen meter was placed in Ashwaubenon Creek at CTH F from May 23 through June 11, 1995 and at CTH G from September 21 through October 2, 1995. State dissolved oxygen standard violations did not occur very often in the fall, but dissolved oxygen levels did not rise above the state standard for days in early summer.

Ashwaubenon Creek has small seasonal runs of some gamefish species. Perch and walleye runs are limited by the lack of suitable substrate for spawning. Since northern pike are more tolerant of low dissolved oxygen, they normally have good runs, and there is some evidence of a resident population in the stream. In 1992 a fish kill occurred upstream of CTH F, turning up forage species and a few northern pike. Good sucker runs still occur in the spring when dissolved oxygen is higher. Large numbers of rusty crayfish have been harvested from Ashwaubenon Creek for sale to local baitshops (*Fish Management Pers. Comm., 1995*)

Sampling was conducted on Ashwaubenon Creek by students from UW-Green Bay at Creamery Road, Parkview Road and a frontage road off HWY 41 in 1995. Data was gathered to compare urban and rural concentrations of phosphorus and suspended solids and their loads to the stream. Water samples were analyzed for suspended solids, ortho-phosphorus and total phosphorus. Combined with flow data, nutrient and sediment loads were determined. The first three samples in 1995 indicated concentrations and loads were highest during the first two runoff events of the

year. An IBI transect was run on Ashwaubenon Creek on August 24, 1995. Eight different macro invertebrate species and 61 individuals were found. White suckers and creek chubs were the most common. The overall warmwater IBI rating was "very poor". A number of fish kills have occurred on Ashwaubenon Creek in recent years. White suckers and a few northern pike have been the witnessed victims. Probable causes of the fish kills are spawning stress, low dissolved oxygen and ammonia spills (*Fish Management Fish Kill Files, 1996*).

Creamery Road on Ashwaubenon Creek was sampled once in 1993 and several times in 1994 as part of a statewide Cryptosporidium spp. and Giardia spp. monitoring effort. In addition, turbidity, suspended solids and E. coli bacteria were also monitored. There were no detections of Cryptosporidium spp. and three detections of Giardia spp. (*Archer et al., 1995*). The streams of this subwatershed are low gradient and slow moving. A large amount of ditching and channelization has taken place, contributing to turbidity, excess nutrients, and low dissolved oxygen levels, which are severe problems. The headwater areas are dry for much of the summer. The subwatershed would benefit from reducing sediment and nutrient loads, which would improve dissolved oxygen levels and habitat for aquatic life.

Rural Nonpoint Source Pollutants

- The Hemlock Subwatershed contains 32 animal lots annually contributing 1,006 pounds of organic phosphorus. This figure represents approximately 11 percent of the phosphorus load from barnyards for D/A watershed.
- Annual upland sediment delivery in the Hemlock Subwatershed is 19,122 tons, or 19 percent of the cumulative watershed load. Cropland is the major source of sediment, contributing 98 percent of the load.
- The Hemlock Subwatershed contributes 34 percent of the total sediment load delivered from streambanks to the D/A watershed.

Dutchman Creek Subwatershed

The Dutchman Subwatershed consists of Dutchman Creek and two tributaries. Twenty-two miles of stream drain 30 square miles of land. Dutchman Creek is 17 miles in length and is classified as a warm water ecosystem. During mid-summer low-flow conditions, most of the creek and all of its tributaries are typically dry.

Dutchman Creek Subwatershed Land Uses	
Agriculture	70%
Wetland/Woodland	7%
Developed	23%

Surface Water Resource Conditions

As with the majority of streams in the watershed, Dutchman Creek exhibited little or no flow

during most of the summer of 1995. Flows which were witnessed occurred only in the upper reaches from June through early August following major rain events. Heavy ditching and draining of farm fields has caused extreme fluctuations in water levels providing a convenient transport path for sediment and nutrients.

The substrate is comprised primarily of soft sediment. Riffle areas are rare and the stream bottom exhibits little scouring. Streambanks are generally in poor condition and buffering is limited or nonexistent. Crops and livestock dominate the riparian zone in the upper reaches, while residential, commercial and industrial land uses are prevalent near the mouth. Dutchman Creek is channelized near the HWY 41 and HWY 172 interchange and upstream and downstream of Oneida Street in Ashwaubenon.

Habitat ratings at Circle Drive and CTH G assessed the stream as "poor". Dissolved oxygen measurements taken June 27 through July 11, 1995 at the Circle Drive location showed that conditions were favorable for tolerant aquatic life. Dissolved oxygen levels never rose above 2.5 mg/l. Upstream of Circle Drive at CTH G dissolved oxygen dipped below the state standard a few times. Dissolved oxygen was much improved at this location due to cooler water temperatures allowing more oxygen to be held in solution. Fisheries resources are limited to the downstream reaches of Dutchman Creek by a dam structure located west (upstream) of Packerland Avenue. This structure is a barrier to upstream migration of fish. The structure's function is unknown, but its removal would likely restore spring spawning runs of suckers and northern pike.

Dutchman Subwatershed's streams are primarily low gradient. Lack of flow is a problem in mid-summer during which the stream becomes stagnant and already low dissolved oxygen levels fall. Ditching in rural areas and channelization in urban areas results in rapid runoff rates and increased water temperatures. The entire subwatershed would benefit from increases in baseflow and decreased levels of sediment and nutrient inputs. Sampling was conducted at Dutchman Creek by UW-Green Bay students at Hanson Road and Broadway. Data was gathered to compare urban and rural concentrations and loadings of phosphorus and suspended solids. Samples analyzed for suspended solids, ortho-phosphorus and total phosphorus were combined with flow data to determine loading rates. Results indicated concentrations and loads were highest during the first two runoff events of the year.

Rural Nonpoint Source Pollutants

- The Dutchman Subwatershed contains 30 animal lots annually contributing 1,834 pounds of organic phosphorus, representing an estimated 20 percent of phosphorus loads from barnyards to the D/A watershed.
- Annual upland sediment delivery is 14,700 tons annually, or 15 percent of the entire watershed load. Cropland is the major source of sediment in this subwatershed, contributing 98 percent of the load.
- The Dutchman Subwatershed contributes 7 percent of the total sediment load delivered from streambanks to the D/A watershed.

Urban Appraisal

The urban section provides individual stream descriptions for water bodies specifically targeted for urban pollution abatement. For greater detail concerning each stream and subwatershed, see the previous section entitled, "Subwatershed Discussions."

Beaver Dam Creek, Lancaster Brook Subwatershed

This creek's potential use is as a warm water ecosystem. It only partially meets its potential due to degradation from nonpoint source pollution. The creek may have a seasonal use potential for runs of suckers and perch. This creek has aesthetic value.

Habitat is poor, due to excessive streambank erosion and 'flashy' stream flows. The stream does maintain perennial flow, however. Based on fish species analyses, water quality is probably quite poor, which is to be expected in such a highly urbanized area.

The urban-related management goal for this stream should be to enhance the quality of the existing aquatic ecosystem, improve the stream for seasonal runs of warmwater sport fish, and to augment the stream's aesthetic and recreational value. To achieve these goals, nonpoint source controls must:

- moderate peak flow discharges;
- control streambank erosion at critical sites;
- comprehensively alleviate instability in the stream's fluvial processes;
- maintain or improve the quality of the stream corridor along the creek; and,
- reduce 1996 urban pollutant loadings for SS, TP, metals, and PAHs by 25 percent during the planning period (1996-2020).

Lancaster Brook/Thornberry Creek, Lancaster Brook Subwatershed

Lancaster Brook has the potential to support a cold water aquatic ecosystem but is slightly degraded and not fully meeting its use potential. Thornberry Creek has the potential to support a cold water sport fish community and may be close to meeting its potential.

Lancaster Brook is in good shape. Upstream of Howard, the creek has good substrate and fairly stable streambanks. Its flows are reasonably stable. Past construction at the AMS facility was probably responsible for heavy silt beds in portions of the stream. The majority of Thornberry Creek is developed with a golf course and large lot residences. Expansion of the golf course could pose problems due to pollutant discharges and stream warming.

The urban-related management goal for Lancaster Brook is to enhance the quality of the existing aquatic community. The urban-related management goal for Thornberry Creek should be to protect the quality of the creek.

To achieve these goals, nonpoint source controls must:

- maintain future (year 2020) loading levels of all urban pollutants (SS, TP, metals, PAH's, peak flows, flow volumes if possible) at 1996 levels for both creeks;
- reduce impervious surfaces in the Thornberry Creek Watershed; and,
- maintain or improve the quality of the stream corridor along both Thornberry Creek and Lancaster Brook.

Trout Creek, Trout Creek Subwatershed

This stream has the potential to support a cold water aquatic ecosystem. The stream has good baseflow in the urban reaches, where most of the land use is large lot residential. Streambanks are in good shape in residential areas.

The urban related management goal for Trout Creek is to protect and enhance current uses in the lower sections of the stream. To achieve these goals, nonpoint source controls must:

- maintain future (year 2020) loading levels of all urban pollutants (SS, TP, metals, PAHs, peak flows, flow volumes if possible) at 1996 levels; and,
- maintain or improve the quality of the stream corridor along the creek.

Slough Creek, Lancaster Brook Subwatershed

This stream has the potential to support warm water ecosystem and appears to be meeting that potential. American brook lamprey have recently been discovered to be inhabiting this stream in the vicinity of Brookfield Avenue.

The urban-related management goal for Slough Creek is to protect the current uses in this perennial section. To achieve these goals, nonpoint source controls must:

- maintain future (year 2020) loading levels of all urban pollutants (SS, TP, metals, PAH's, peak flows, flow volumes if possible) at 1996 levels.

Duck Creek, Fish Creek and Lancaster Creek Subwatersheds

The potential use of this creek is a warm water ecosystem. The urban-related management goal is to enhance the current uses of this stream. To achieve this goal, nonpoint source controls must:

- reduce the future loading of urban pollutants by 25% from the existing 1996 loads.

Ashwaubenon & Dutchman's Creeks, Hemlock Creek & Dutchman Creek Subwatersheds

Both streams have the potential to support a warm water ecosystem, but are so heavily affected by upstream rural land uses that urban goals have been based on reduction needs to achieve the goals for Green Bay and the Lower Fox River. The reduction goal will be based on needs identified in the Remedial Action Plan, which does not specify any particular goals for urban toxic materials. Either a "no change" goal or a "25% reduction" goal should be applied.

Urban Management Goals for Selected Streams in the Duck Apple and Ashwaubenon Creeks Watershed

Creek (Subwatershed)	Management Goal	Steps to meet Goal
Beaver Dam (Lancaster Brook Subwatershed)	Moderate peak flow Control streambank erosion Alleviate instability in stream's fluvial processes Maintain or improve corridor	Reduce SS, TP, PAH's by 25%
Lancaster Brook /Thornberry Creek (Lancaster Brook Subwatershed)	Enhance the quality of the warm water fisheries of Lancaster Brook , Protect Thornberry Creek	No change alternative for future pollutant loadings, keep at 1996 levels
Trout Creek (Trout Creek Subwatershed)	Protect lower reaches which now hold warm water species	No change from 1996 loadings Maintain and improve corridor
Slough Creek, (Lancaster Brook Subwatershed)	Protect current uses	No change from 1996 loadings for SS, TP, Metals, PAH's, peak flows
Duck Creek (Fish Creek and Direct Drainage)	Enhance current use of stream	25 percent reduction in Direct Drainage to meet goal
Apple Creek (Appleton Subwatershed)	Maintain current condition of stream, protect current uses	No change from existing 1996 loads of urban and rural pollutants
Apple Creek (Freedom Subwatershed)	Enhance current use of stream	25 percent reduction in rural and urban pollutants from 1996 loads
All Streams (Ashwaubenon, Hemlock, & Dutchman's Subwatersheds)	Green Bay Remedial Action Plan goals established 1989	No change from 1996 loadings for SS, TP, Metals, PAH's, peak flows

Lakes

Although no natural lakes exist within the project area, an abandoned quarry near the intersection of CTY HWY "J" and North Overland Road supports a diverse population of largemouth bass and panfish. The quarry has a surface area of five and one half acres and is maintained through groundwater recharge (as a result of prior excavation). During storm events, the Duck Creek occasionally overflows its banks and connects with the quarry. In addition, the Oneida Nation own a small lake on the DeCaster property within the city limits of Green Bay. The lake supports a diverse population of game fish species, including trout.

Wetlands

The largest contiguous areas of wetlands in the watershed occur at the headwaters of the Duck and Trout Creeks, with dozens of smaller riparian wetlands adjacent to perennial and intermittent streams throughout the project area. These riparian, or floodplain wetlands, support furbearers and water fowl populations and may provide seasonal habitat for sport fish. WDNR conducted a wetland and wildlife habitat inventory during the inventory phase of the PWP to identify existing and modified or converted wetlands for the purpose of protection from degradation or potential restoration. The inventory focused on wetlands which are presently, or have been in the past,

degraded through drainage, grazing, cropping, or other activities causing water storage loss and build up of sediments. Data was collected on 439 wetlands (11,990 acres), from Natural Resource Conservation Service maps, air photos, and DNR wetland inventory maps.

Wetland Inventory Summary

Subwatershed	Total Sites	Total Acres
Burma Swamp	93	2,493
Fish Creek	80	5,878
Trout Creek	32	732
Lancaster Brook	60	2,341
Hemlock Creek	43	357
Dutchman Creek	41	483
Total	**349**	**12,284**

Recreation

Recreational opportunities on and in the watershed's streams have been severely impaired due to excessive sedimentation and nutrient loading. In addition, land use changes in upland areas have led to increased peak flows and diminished year-round flow within surface waterways, further reducing fishing and swimming opportunities for watershed residents. However, there exists great potential for future uses of watershed streams. The installation of best management practices, including restoration of riparian and headwater wetlands, will result in improvements in water quantity and quality. This will provide increased opportunities for fishing, canoeing, and swimming, while improving near water activities like hiking, hunting, picnicking, and wildlife observation.

Groundwater Resources

The most important potable water supply within the watershed is an underground aquifer composed of Cambrian and Ordovician age sandstone. This system is the principle source available to watershed residents for domestic use. The upper-most portion of the sandstone aquifer ranges from an elevation of less than 500 feet above sea level in the eastern portion of the watershed to 600 feet at its most western extent.

Principle aquifers within the watershed are found in the St Peters formation and the Trempealeau, Tunnel City and Elk Mound groups. Private wells in the watershed vary from 50 to 550 feet in depth and provide the bulk of the area's residents potable water needs. Wells located within the St. Peter's formation are considerably shallower than those found in the deeper Cambrian layers. Artesian wells and springs are present in areas where the groundwater is confined by a low permeability layer such as a clay lens. These lenses occur throughout the glacially deposited sediments. Subsurface groundwater saturation depths vary considerably in the project area.

Groundwater quality in the watershed is generally considered good, although localized problems do occur, and arsenic has been detected in wells. Private well samples were collected and analyzed for nitrate (NO_3) + nitrite (NO_2). Sample analytical results are summarized in Table 2-3. Samples analyzed for nitrate (NO_3) + nitrite (NO_2) showed concentrations ranging from "no detect" to 0.40 parts per million (ppm) or milligrams per liter (mg/L). The groundwater enforcement standard (ES) for nitrate is 10 mg/L. Nitrate (NO_3) + nitrite (NO_2) concentrations above 2 mg/L exceed the state's preventive action limit (PAL). No sample exceeded 2 mg/l. Results so far do not indicate a pattern of groundwater contamination that can be linked to specific sources of nitrate. These results can not be extrapolated to represent groundwater quality throughout the entire watershed.

No samples were collected for coliform bacteria or hazardous substances such as volatile organic compounds. Coliform bacteria can be a drinking water problem where septic systems, land spreading of manure or barnyards are located up gradient (generally uphill) of a well. Bacteria can enter the drinking water supply along the well casing of improperly constructed wells. Some wells with high levels of bacteria can be rehabilitated. Volatile organic compounds (VOCs) generally enter a well from nearby leaking underground gasoline or other fuel storage tanks and from spills. Once these compounds are in the groundwater they are difficult to clean up. In general, wells contaminated with VOCs have to be abandoned and a new well drilled.

Arsenic

Research into the presence of arsenic in groundwater in Brown and Outagamie County began in 1991 after this naturally occurring metal was found in groundwater below a potential landfill site in Winnebago County. Since that time, researchers have investigated 2125 private water supply wells for arsenic over a broad geographic range in parts of Brown and Outagamie counties. Overall, the range of concentrations found in wells within these three counties was between 1.0 ug/l and 12000 ug/l. Results showed that 32 percent of sampled wells contained greater than 5 micrograms per liter (ug/l), which is the state preventative action limit (PAL). Eighty-six (86) of the 2125 wells exceeded the state health advisory limit of 50 micrograms per liter (50 ug/l) (*Burkel and Stoll, May 1996*).

The presence of arsenic in this region is principally due to naturally occurring processes within two of the region's geologic formations -- the St. Peter Sandstone and the overlying Platteville/Galena Dolomite. Researchers believe that contact between the two formations is the predominant source of elevated arsenic concentrations. Unfortunately, these two formations are the region's principle sources of potable water supply.

Based on data gathered from the study cited above, an arsenic advisory has been designated for the Outagamie County portion of the D/A watershed. Guidelines for new well drilling and construction have reduced the risk of groundwater contamination by arsenic in new wells. Fifteen wells containing arsenic concentrations exceeding the health advisory were successfully reconstructed or replaced based on the new guidelines. These actions eliminated or substantially reduced arsenic levels in the well water samples.

Water Supplies

Water supplies for domestic, agricultural, and industrial uses in the Duck and Ashwaubenon Creeks watershed are obtained from both private groundwater sources and municipal systems. There are three principal aquifers lying beneath the watershed from which groundwater is obtained. Water obtained from these aquifers is either pumped from individual private wells or is through municipal pumping facilities.

Nitrate Detected in Sampled Wells in the Duck and Ashwaubenon Creeks Watershed

NITRATE		
	Number of Nitrate Samples	
Subwatershed	less than 2.0 mg/l	%
Trout Creek	12	100
Fish Creek	29	100
Burma Swamp	24	100
Dutchman Creek	20	100
Hemlock Creek	17	100
Freedom	18	100
Appleton	14	100
Lancaster Creek	12	100
Totals	146	100

Potential Groundwater Quality Problems

Potential sources of groundwater quality problems in the Duck and Ashwaubenon Creeks Watershed include "Superfund" sites, solid and hazardous waste disposal sites, leaking underground storage tanks sites and spill sites. Many of these sites are listed in the WDNR Publication SW-144, The Wisconsin Remedial Response Site Evaluation Report (December 1991) and the publication PUBL-SW-108-93, Registry of Waste Disposal Sites (June 1993). The database from which these documents were generated is continually updated. There is one Superfund site in the project area and one located just outside of the area; the former is in Brown County; the latter, in Outagamie County. Potential pollution associated with nonpoint sources is described in various sections throughout the remainder of this chapter.

Sewage Treatment Systems and Sewer Service Area Planning

The availability of sanitary sewer is growing in the project area. Populations are served in both the Green Bay Area (by the Green Bay Metropolitan Sewerage District) and in the Fox Cities in Outagamie County by Heart of the Valley and Appleton Sewer Service Areas (SSAs). Requests to expand all three of these SSAs, which in part lie within the D/A watershed, were submitted in 1997. Wastewater generated outside SSAs is disposed of through private on-site systems.

Private Sewage Systems

Septic systems consist of a septic tank and a soil absorption field. Septic systems fail due to soil type, location of system, poor design or maintenance, such as when tanks go unemptied. Pollutants from septic system discharges include: nitrates, bacteria, viruses and hazardous materials from household products. Generally, in the D/A watershed, the majority of soils (clays and silty-clays) are not suitable for conventional septic tank soil absorption systems. Land spreading of septic system waste during the winter months can also create surface water quality problems.

Solid Waste Disposal Sites

There are 38 abandoned waste disposal sites in the watershed. This includes transfer stations, which are grouped with landfills in the *Registry of Waste Disposal Sites* (June 1993), from which this data was obtained. There are 7 active waste disposal sites in the watershed. Two of these sites are active landfills in Brown County (WDNR, PUBL-SW-108-93).

Petroleum Storage: Leaking Underground Storage Tank (LUST) Sites

The Wisconsin Remedial Response Site Evaluation Report (DNR SW-144-91) lists sites identified through the LUST program. The LUST list is dynamic and frequently updated. Please contact DNR for a current list of sites. At the time this plan was written, 1996, there were roughly 300 known LUST sites in the watershed. Of these, 228 were in Outagamie County (112 in Appleton) and 164 in Brown County (134 in Green Bay). Appendix B lists these sites and substances found.

Other Contaminated Sites

The Wisconsin Remedial Response Site Evaluation Report also has the 'Inventory of Sites or Facilities Which May Cause or Threaten to Cause Environmental Pollution Spills' program list, which includes sites or facilities identified under the Hazardous Substance Spill Law.

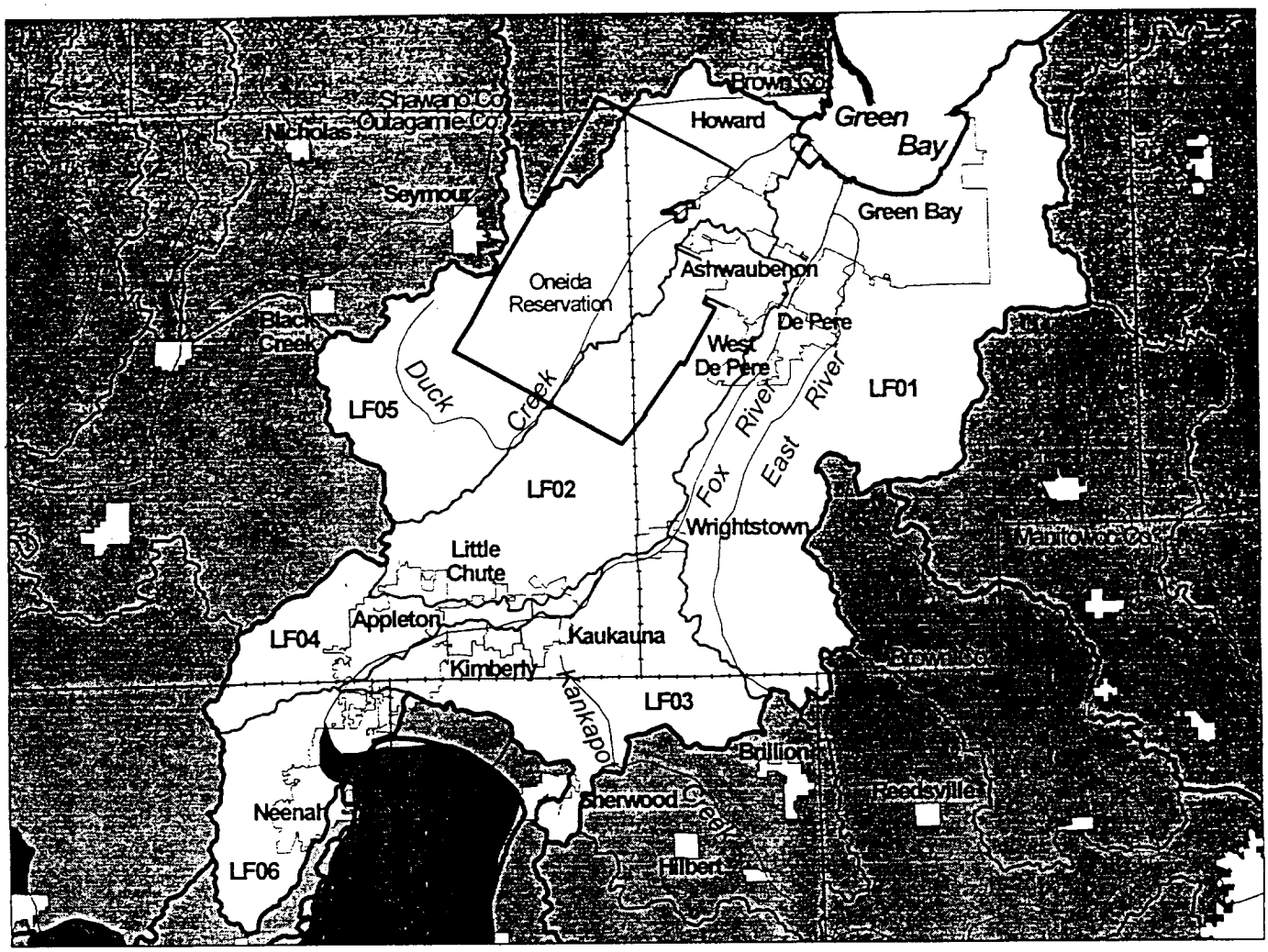
Conclusion

The surface water and aquatic life resources in the Duck and Ashwaubenon Creeks Watershed would benefit from more consistent year-round streamflow. Extensive tiling of agricultural land and ditching and channelizing of streambeds has caused rapid overland flow of runoff from the system. Nutrients and sediments are cause for concern because of their affect on dissolved oxygen levels and stream clarity. Land use planning, in both urban and rural areas, is critical because of the watershed's proximity to rapidly growing urban areas like Green Bay and Appleton. Erosion control and stormwater plans are two key management tools that should be part of any development plan in the watershed to maintain or improve water quality.

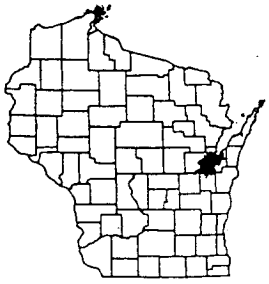
There exists great potential for future uses of watershed streams. The installation of best

management practices, including restoration of riparian and headwater wetlands, will result in improvements in water quantity and quality. This will provide increased opportunities for fishing, canoeing, and swimming, while improving near water activities like hiking, hunting, picnicking, and wildlife observation. The Oneida Nation will continue to work with our local, state, and federal partners to improve and protect the natural environment of the Oneida Reservation and Northeast Wisconsin for our children, and our children's children. . .to the *Seventh Generation.*

Lower Fox River Basin



Study Area



Mapscale 1:423,308

LEGEND
- Watershed Boundary
- Management Unit Boundary
- County Boundary
- River
- Open Water
- Municipal Area
- Oneida Reservation

Subwatershed Codes and Names

LF01 = East River
LF02 = Apple & Ashewaubenon Creeks
LF03 = Fox River/Appleton
LF05 = Duck Creek
LF06 = Little Lake Butte des Morts

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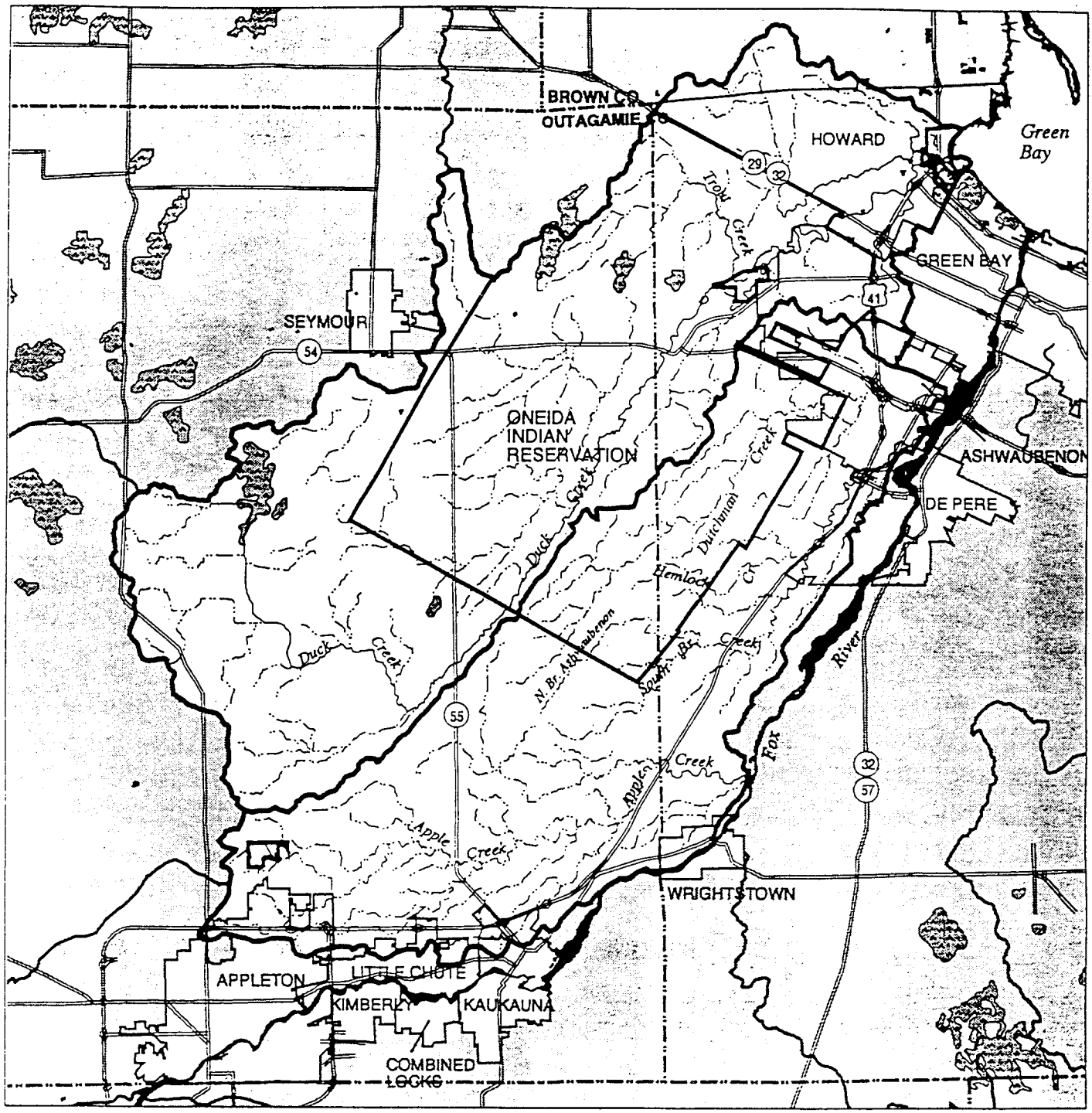
Wisconsin Department of Natural Resources
Water Division GIS Lab
November 1997

Duck and Ashwaubenon Creek Watersheds



Wisconsin Department of Natural Resources
Water Division
Bureau of Watershed Management
November 1997

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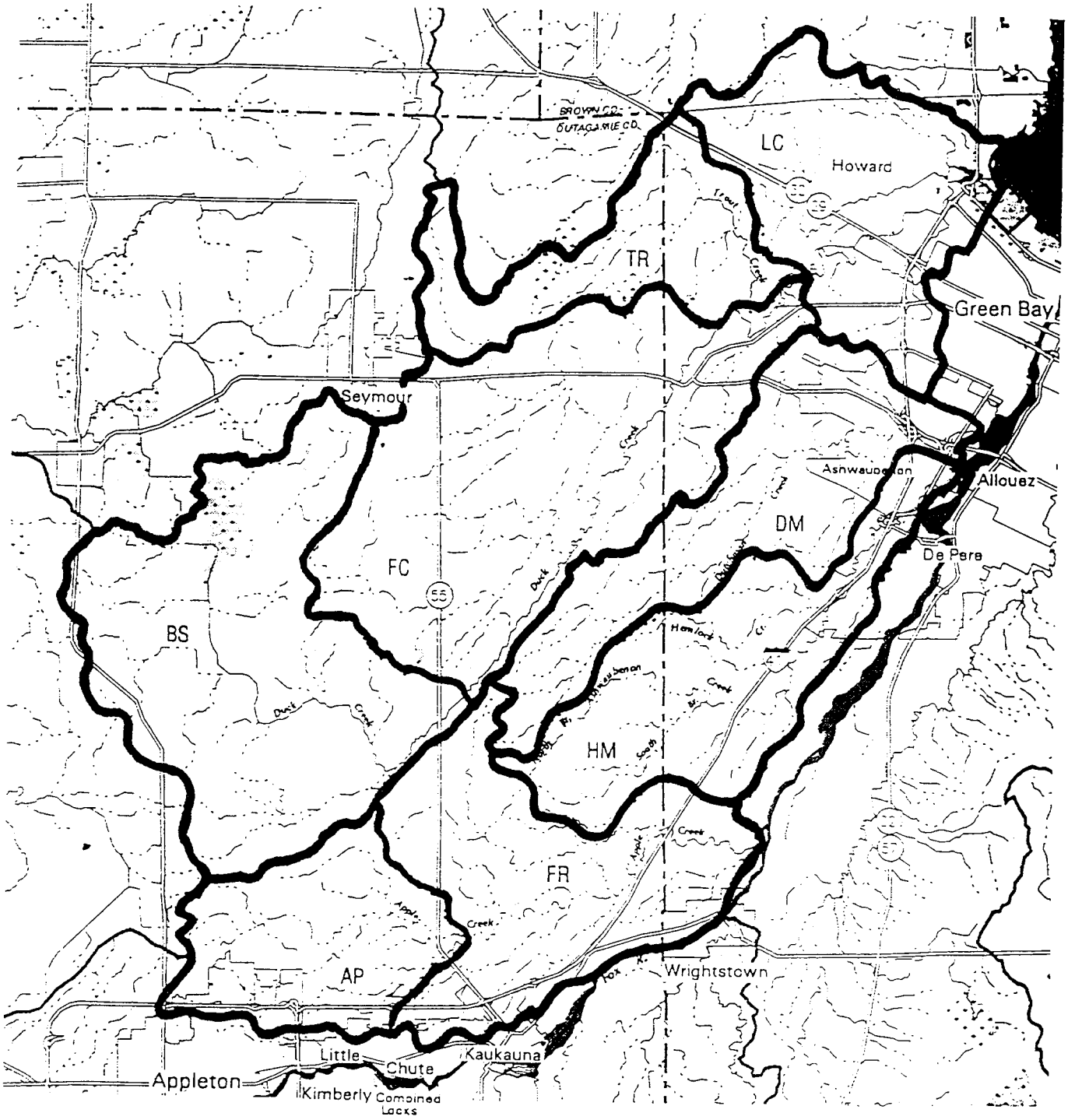
Mapscale 1:220,000

LEGEND

- Watershed Boundary
- Oneida Reservation
- Highway
- Perennial Stream
- Intermittent Stream
- County Boundary
- Open Water
- Wetland
- Municipality
- Watersheds

Duck and Ashwaubenon Creek Watersheds
Rural Subwatersheds



LEGEND

- Watershed Boundary
- Project Boundary
- Subproject Boundary
- Major Highway
- Perennial Stream
- Intermittent Stream
- County Boundary
- Wetland
- Open Water
- Municipal Area

Study Area

Subwatershed Codes and Names

DM = Dutchmans Creek	AP = Appleton
FC = Fish Creek	FR = Freedom
TR = Trout Creek	HM = Hemlock
LC = Lancaster	BS = Burma Swamp

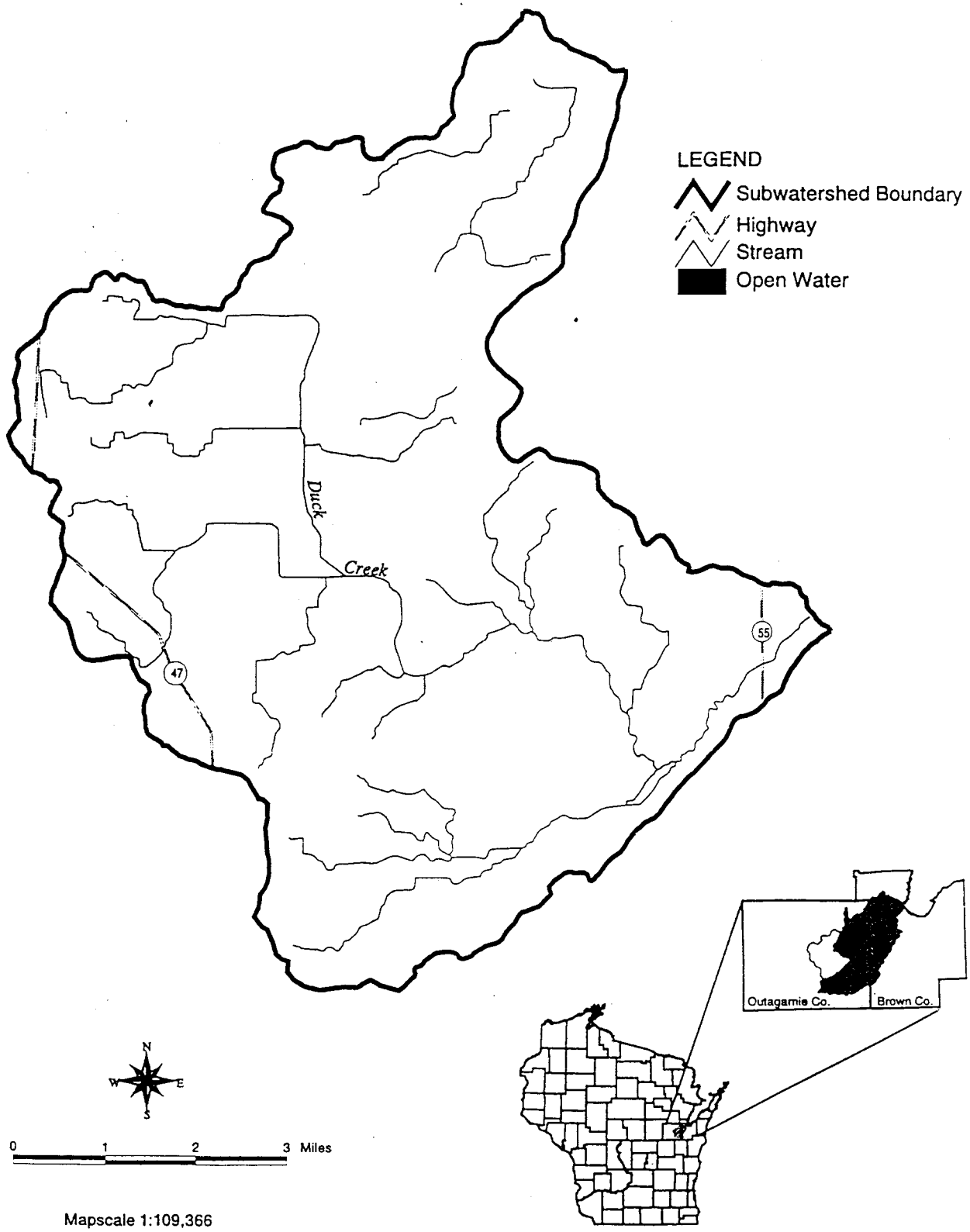
0 2 4 6 Miles

0 2 4 6 8 10 Kilometers

Scale 1:213,351

Wisconsin Department of Natural Resources
Watershed Management
June 1997

Burma Swamp Subwatershed

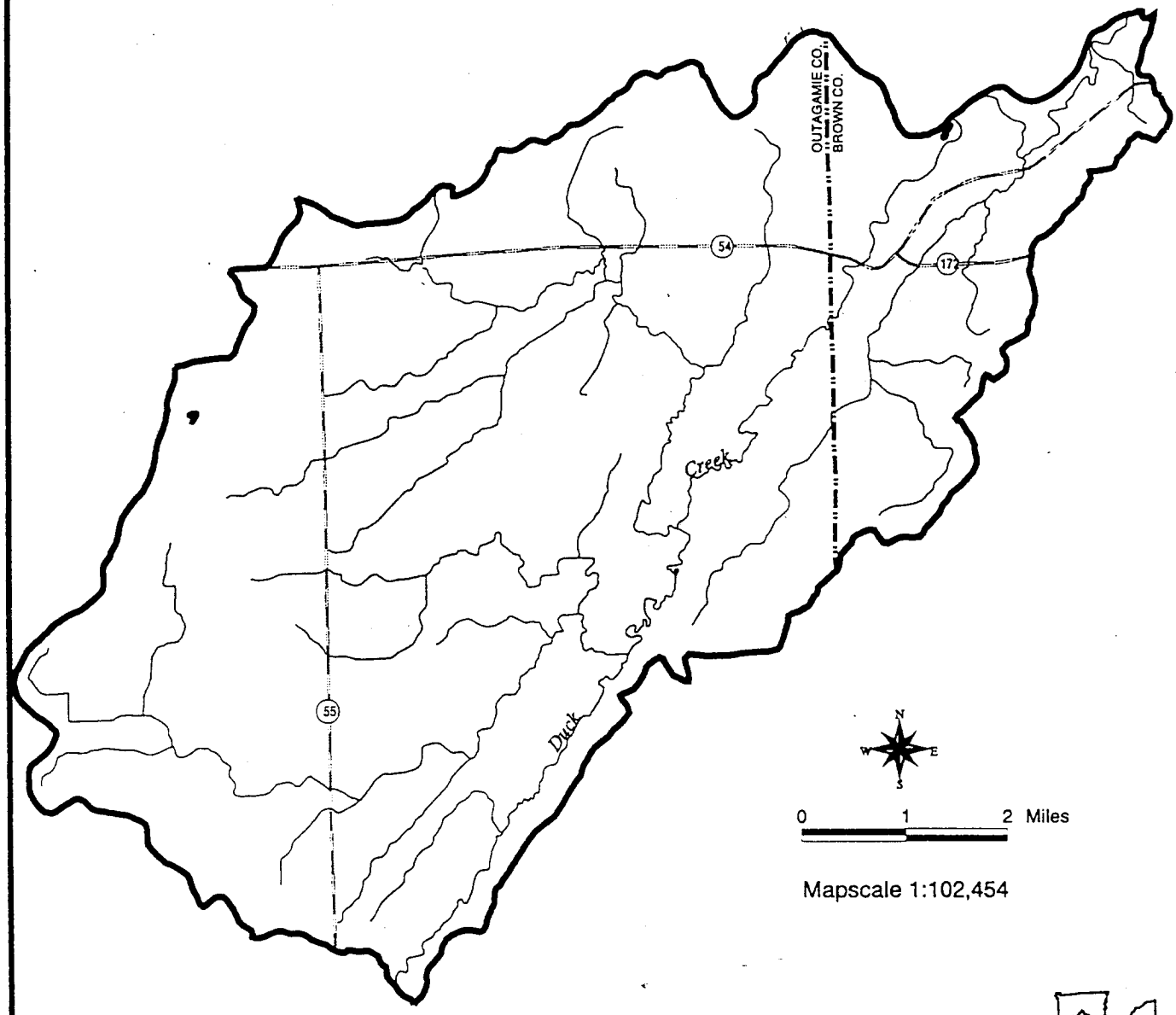


Mapscale 1:109,366

PROJECT AREA

Wisconsin Department of Natural Resources
Water Division
Bureau of Watershed Management
May 1997

Fish Creek Subwatershed



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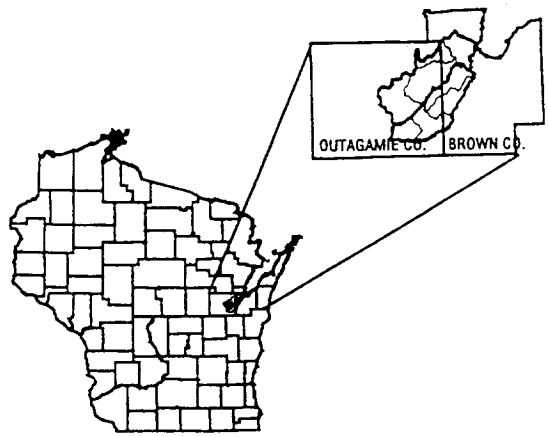


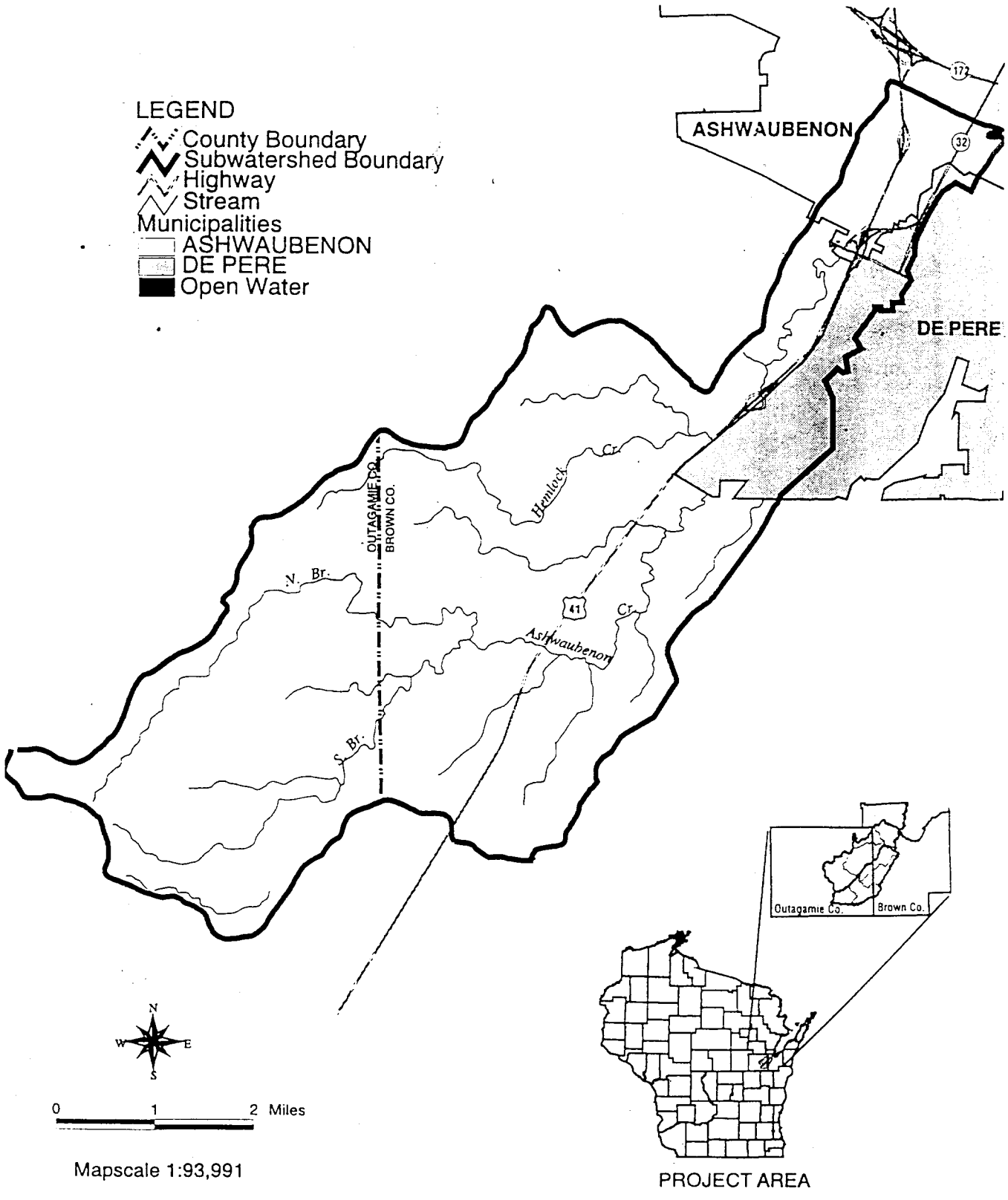
PROJECT AREA

LEGEND

- Subwatershed Boundary
- County Boundary
- Highway
- Stream
- Open Water

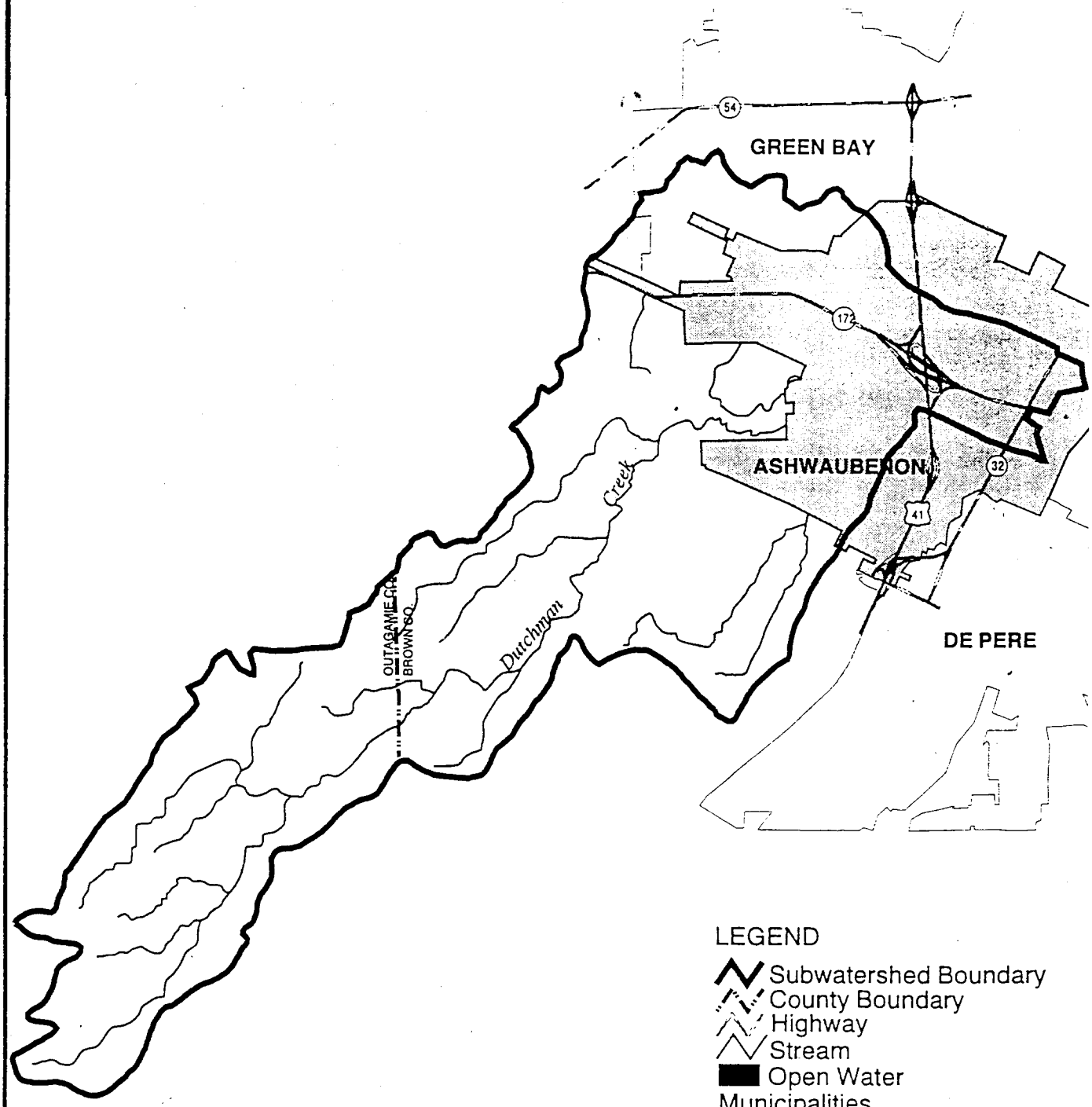
Wisconsin Department of Natural Resources
Water Division
Bureau of Water Resources Management
May 1997

Hemlock Creek Subwatershed



Wisconsin Department of Natural Resources
Water Division
Bureau of Watershed Management
May 1997

Dutchman's Creek Subwatershed

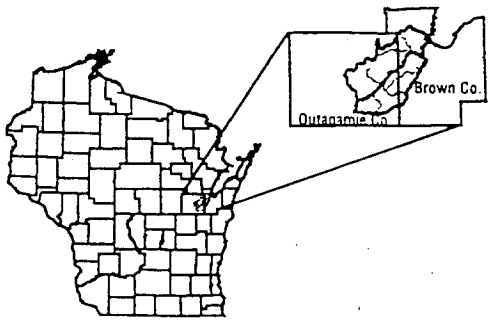


LEGEND

- Subwatershed Boundary
- County Boundary
- Highway
- Stream
- Open Water

Municipalities

- ASHWAUBENON
- GREEN BAY
- DE PERE



PROJECT AREA

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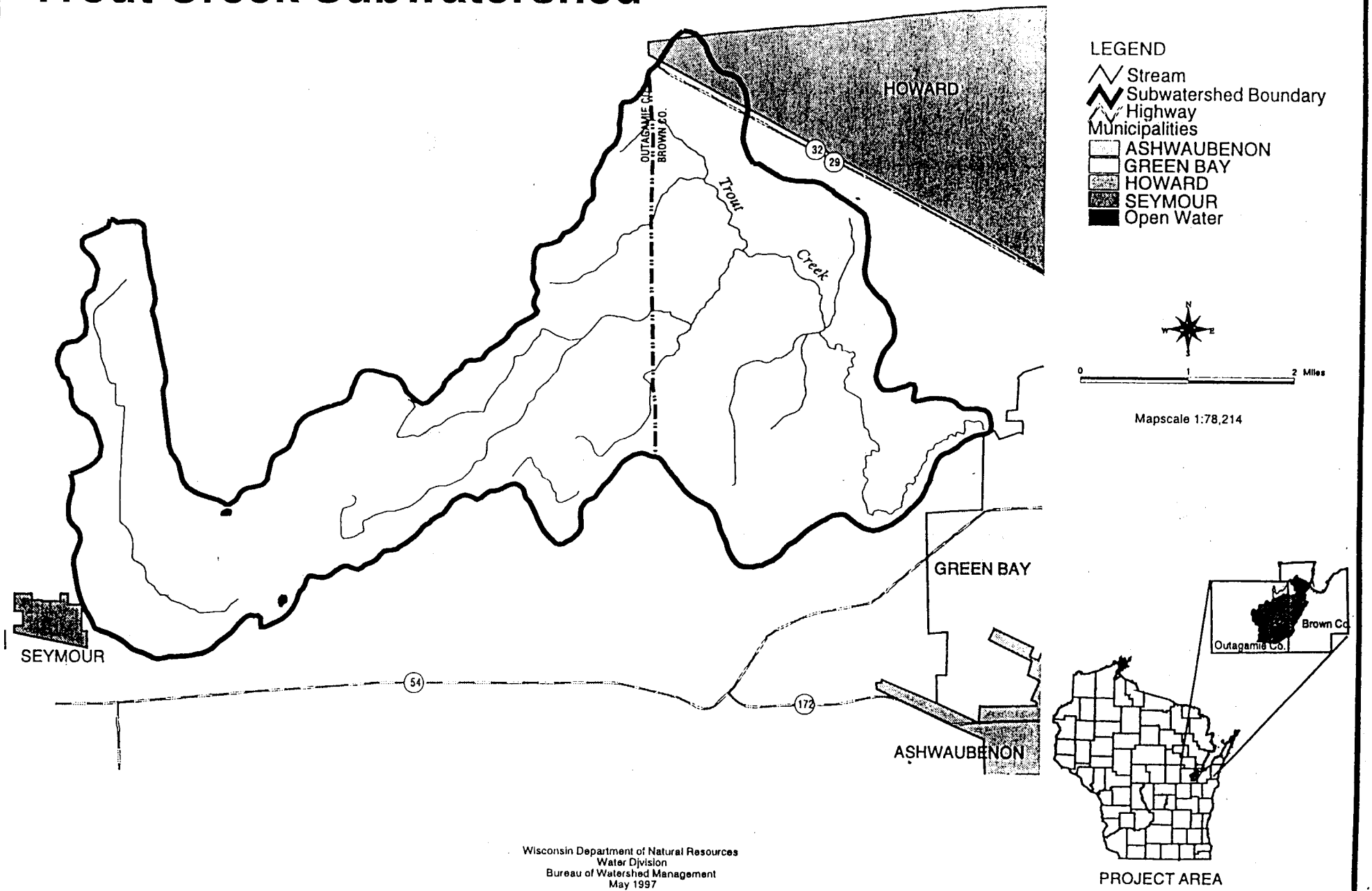
Mapscale 1:99,100

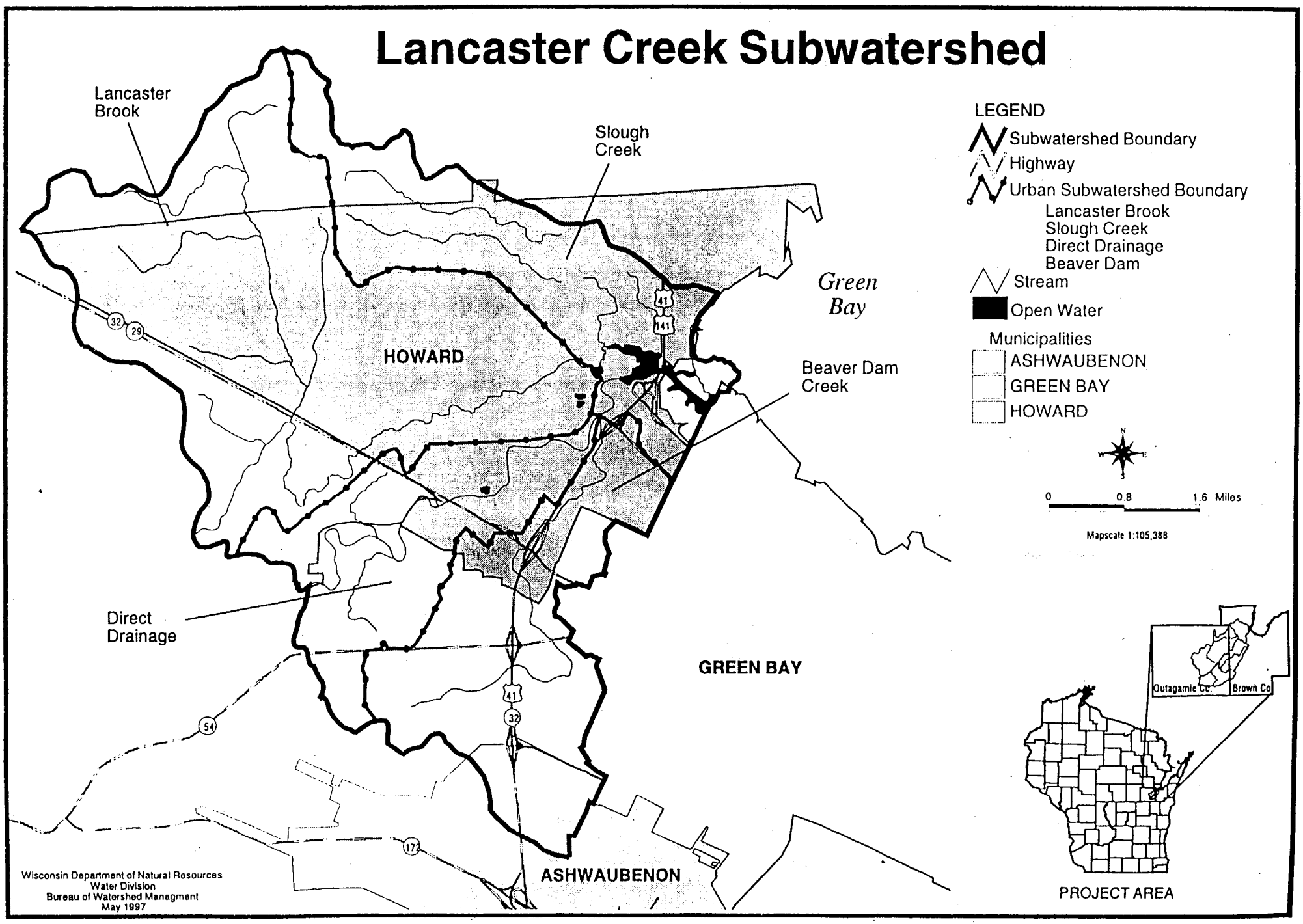
Department of Natural Resources
Water Division
Bureau of Watershed Management
May 1997

Trout Creek Subwatershed



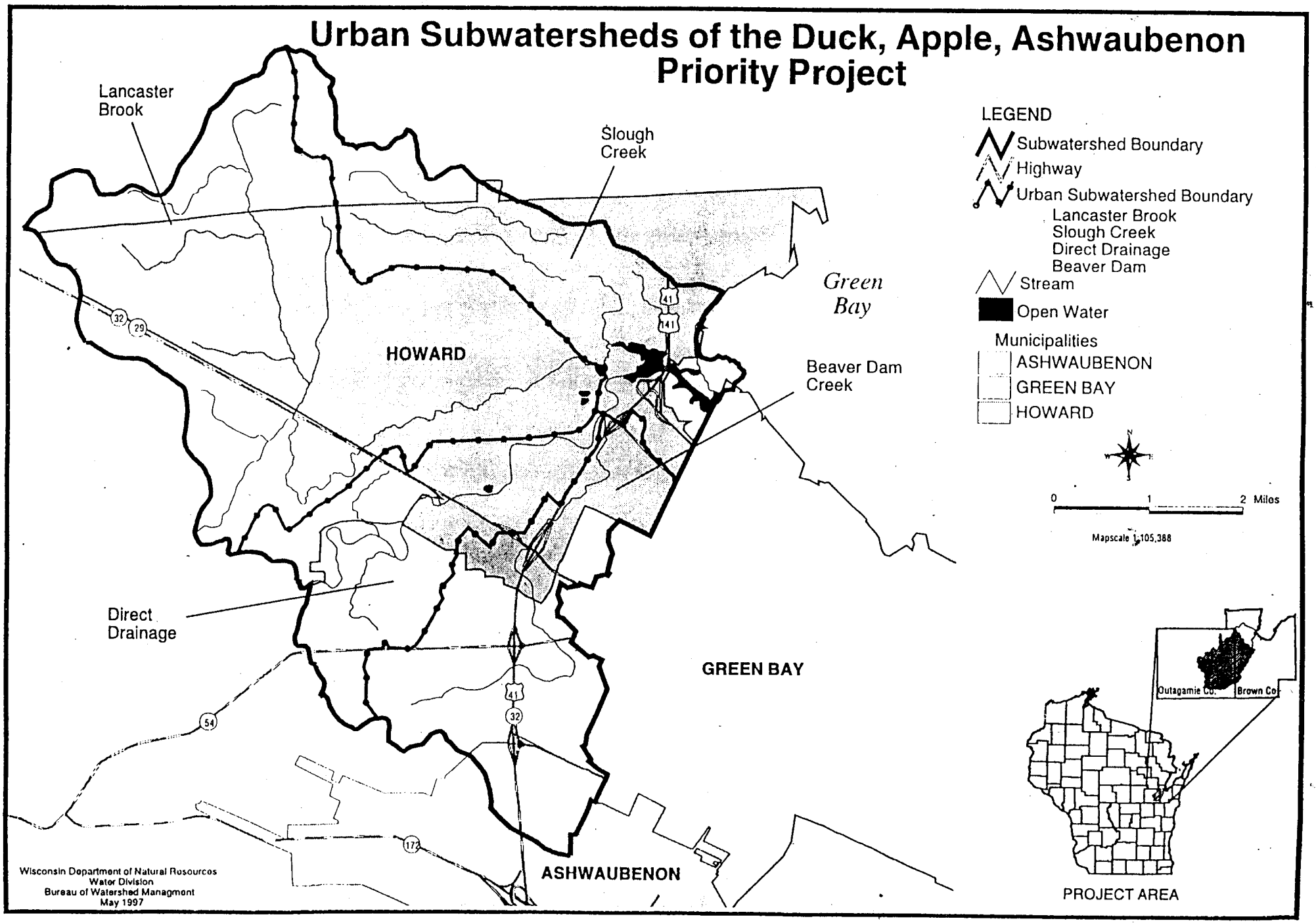
Wisconsin Department of Natural Resources
Water Division
Bureau of Watershed Management
May 1997

Lancaster Creek Subwatershed



Wisconsin Department of Natural Resources
Water Division
Bureau of Watershed Managment
May 1997

Urban Subwatersheds of the Duck, Apple, Ashwaubenon Priority Project



Oneida Tribe of Indians of Wisconsin

Environmental, Health & Safety Department

Phone: (920) 497-5812
Fax: (920) 496-7883

P.O. Box 365
3759 W. Mason Street
Oneida, WI 54155

21 Jan 99

Unified Watershed Assessment Working Group
USEPA 4503F
401 M. Street SW
Washington D.C. 20460

Dear sir/madam,

On August 20, 1998, the Oneida Nation Environmental, Health and Safety Department submitted a detailed assessment of the watersheds of the Oneida Reservation to Region 5 of the United States Environmental Protection Agency (USEPA). The document fulfilled the Tribe's obligations under the initial submittal guidelines for the Unified Watershed Assessment component of the Clean Water Action Plan.

At this time, we respectfully request that USEPA adopt the Tribe's August 20, 1998 submittal as the ***Final Unified Watershed Assessment*** for the Oneida Nation. We understand that our submittal will be treated as a 'living document' that can be modified and amended as future needs dictate. The Oneida Nation is involved in ongoing, comprehensive point and nonpoint source water quality monitoring within the watersheds. In addition, we have initiated planning for an extensive evaluation of wetlands and wildlife habitat throughout the 65,400-acre Oneida Reservation. We anticipate applying for funds for the implementation of our plan in the near future.

As always, we look forward to continuing our cooperative partnership with USEPA as we work to protect and enhance water quality and wildlife habitat on the Oneida Reservation and throughout Northeast Wisconsin. Should you require any additional information, please contact Mr. Jeff Sanders, Environmental Planner, at 920- 497-5812 (jsanders@oneidanation.org).

Cordially,

Jennifer Hill Kelley

Jennifer Hill-Kelley
Oneida Nation Environmental Quality Director

cc: Dan Cozza, USEPA Region 5 WS-15J
Mary Manydeeds, BIA
Ronald K. Baba, Oneida Nation EH&S

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V

DATE: February 19, 1999

SUBJECT: Tribal Unified Watershed Assessment

FROM: Dan Cozza, Region V Tribal UWA coordinator

TO: Greg Gwaltney, EPA-HQ UWA Workgroup

Greg: as per a conversation today with John Benson, EPA contractor, I am sending you copies of the draft Unified Watershed Assessments (UWAs) for the Oneida Nation, Wisconsin and for the Lac du Flambeau Band of Lake Superior Chippewa Indians. Both of these tribes have recently acknowledged that their draft UWAs will not be revised at this time and should be considered as their final UWAs. John stated that you did not have these drafts in your files so I am forwarding these on to you now. The UWA for Oneida Nation has a large report appended to it, entitled, "Nonpoint Source Control Plan for the Duck, Apple and Ashwaubenon Creeks Priority Watershed Project". This report is over 250 pages in length. I copied the cover and the introduction section of this report for you and if you need the full report, please let me know and I will photocopy it for you.

I am also including a copy of a letter that I received from the Red Cliff Band of Lake Superior Chippewas dated January 11, 1999. Red Cliff initially had their draft attached to the Wisconsin Department of Natural Resources' UWA (I attached this to their 1/11/99 letter) and this letter is amending it to make this their final.

To date, nine tribes have finalized their UWAs. This includes the three mentioned above and the others are:

Fond du Lac Band of Chippewa
Red Lake Band of Chippewa
Shakopee Mdewakanton Sioux Community
Bad River Band of Chippewa
Upper Sioux Community
Lower Sioux Community

I expect several more tribes to finalize their draft UWAs within the next several weeks. This will be done by the Tribes either stating that their drafts can be considered as their final (as done by Oneida and LDF), by resubmitting their redrafted UWA (as done by Shakopee and Fond du Lac), or by stating that the version incorporated with their respective state agencies may be considered as their final UWA as well as the state's (as done by Red Lake).

If you have any questions regarding the above or need any other information, please do not hesitate to call me at 312-886-7252.

cc:
P. Thomas, EPA - Region V (w/o attachments)
T. Henry, EPA - Region V (w/o attachments)

SOVEREIGN NATION OF THE ONEIDA IN WISCONSIN
ECOSYSTEM PLANNING AND PROTECTION
P.O. Box 365, Oneida, Wisconsin 54155
920.497.5812 FAX 920.496.7883

20 August 1998

Ms Jo Lynn Traub, Director
Water Division
USEPA, Region V
77 West Jackson Blvd
Chicago, Illinois 60604

Dear Ms Traub,

Please find attached, the initial submission of the ***Oneida Nation Unified Watershed Assessment.*** So as to insure timely delivery of our watershed assessment, we transmit it first by electronic mail. Hard copy of the maps and other appendices as well as a complete copy of the assessment follow under separate cover.

As you will note, the Oneida Nation Environmental Health and Safety Department and the Environmental Planning Section have collaborated on the production of a *detailed* assessment of the Duck Creek watershed, the major watershed within the boundaries of the federally recognized Oneida Reservation. This detailed watershed assessment is the result of the broad range of technical and planning analyses completed by the Nation as it prepares to implement a comprehensive program of ecosystem management to complement its economic development and diversification initiatives.

The Oneida Nation looks forward to participating in the continued implementation of the Clean Water Action Plan. We believe that our activities in the development of place based partnerships for nonpoint pollution prevention, urban stormwater management, and environmentally sensitive land use will meld smoothly into the integrative goals of the CWAP and empower the Oneida Nation in its pursuit of a community for the Seventh Generation.

If you have any questions or comments please contact Mr Jeffrey Sanders, Senior Environmental Planner (jsanders@oneidanation.org).

We look forward to the growth our partnerships with Region V.

Cordially,

Ronald K Baba, BArch, PhD
Senior Advisor

cc: Mary Pat Tyson, EPA RV; Tom Wahl, EPA AIEO; Phil Oshida, EPA OWOW; Paul Thomas, EPA RV
Robert Newport, EPA RV; Herb Nelson, DOI, BIA; Jim Baumann, WiscDNR
Pat Leavenworth, WI State Conservationist

Oneida Tribe of Indians of Wisconsin

Environmental, Health & Safety Department

Phone: (920) 497-5812
Fax: (920) 496-7883

P.O. Box 365
3759 W. Mason Street
Oneida, WI 54155

8/7/98

Mary Manydeeds
Hydrologist - Minneapolis Area Office
Bureau of Indian Affairs
331 South 2nd Ave
Minneapolis, MN 55401

Dear Ms. Manydeeds:

Enclosed is a map and the table relating to the BIA's efforts with respect to unified watershed assessments. The Oneida Nation intends to finalize our draft Unified Watershed Assessment in the near future, and a copy will be provided once it is complete.

Waters of the Reservation fall into two separate Hydrologic Unit Codes (HUC):

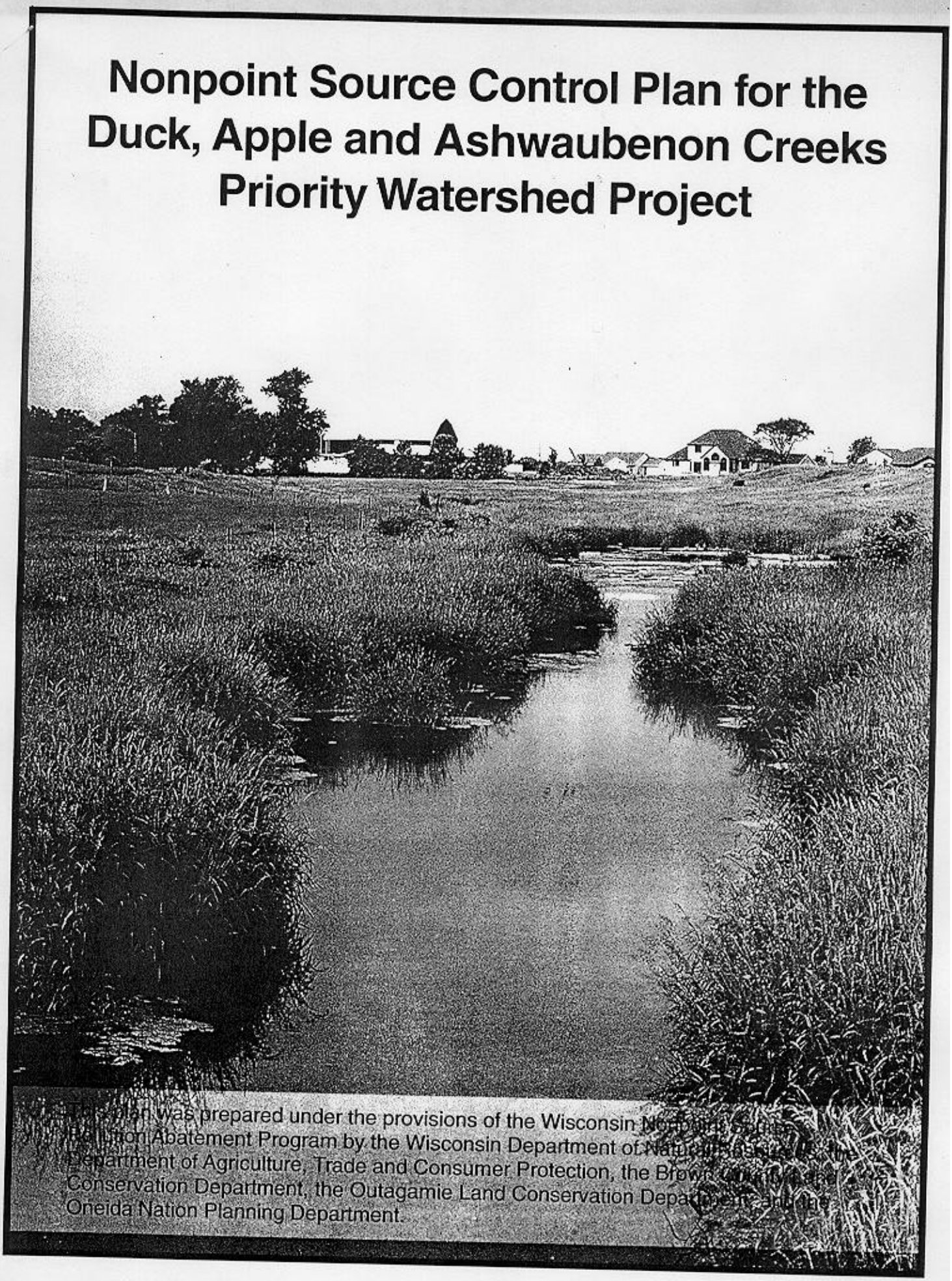
- 04030103 Duck-Pensaukee Watershed, &
- 04030204 Lower Fox River Watershed.

Generally waters of the Reservation should fall into Category 1 -- Watersheds in Need of Restoration. Thank you.

Sincerely,

John Koss
Water Resources Team Leader

Nonpoint Source Control Plan for the Duck, Apple and Ashwaubenon Creeks Priority Watershed Project



This plan was prepared under the provisions of the Wisconsin Nonpoint Source Pollution Abatement Program by the Wisconsin Department of Natural Resources, the Department of Agriculture, Trade and Consumer Protection, the Brown County Land Conservation Department, the Outagamie Land Conservation Department, and the Oneida Nation Planning Department.

Nonpoint Source Control Plan for the Duck, Apple and Ashwaubenon Creeks Priority Watershed Project

The Wisconsin Nonpoint Source Water Pollution Abatement Program

JUNE, 1997

This Plan Was Cooperatively Prepared By:

Wisconsin Department of Natural Resources
Wisconsin Department of Agriculture, Trade and Consumer Protection
and
Outagamie County Land Conservation Department
Brown County Land Conservation Department
Oneida Nation Planning Department

Publication WT-493-97

For copies of this document please contact:

Department of Natural Resources
Bureau of Watershed Management
Runoff Management Practices Section
P.O. Box 7921
Madison, WI 53707-7921

The Department of Natural Resources acknowledges the Environmental Protection Agency's Region V Office for their involvement in the partial funding of this activity through Section 319 of the Water Quality Act.

Summary

Introduction

The purpose of the Nonpoint Source Control Plan developed for this project is to assess nonpoint pollutants in the Duck, Apple and Ashwaubenon Creeks Watershed and guide the implementation of control measures. Nonpoint source control measures and education are needed to meet very specific water resource objectives designed to protect and enhance the surface and groundwater in the watershed.

Nonpoint source (runoff) pollution cannot be easily traced to a single point of origin such as a point source effluent discharge from a wastewater treatment plant or industrial plant. Nonpoint source pollution occurs when rainwater or snow melt flows across the land and picks up soil particles, organic wastes and fertilizers that become pollutants when carried to surface and/or groundwater. These soil particles and organic wastes contain phosphorus and nitrogen, the same compounds found in commercial fertilizers. Soil particles also become sediment in the small streams, the Fox River and their receiving water, the bay of Green Bay. Nonpoint source pollution in the Duck, Apple and Ashwaubenon Creeks Watershed has lead to a general decrease in the quality of these streams and their tributaries. A decrease over time in the number of wetlands, through ditching and conversion to cropland, has lead to degraded water quality and unstable baseflows. Secondary sources of nonpoint pollutants in the Duck, Apple and Ashwaubenon Creeks watershed originate from streambank erosion and gully erosion resulting in sediment deposition in the creeks.

The Nonpoint Source Pollution Control Plan for the Duck, Apple and Ashwaubenon Creeks Priority Watershed was prepared by the Outagamie County Land Conservation Department, the Brown County Land Conservation Department and the Oneida Nation Planning Department with assistance from the Department of Natural Resources (DNR) and the Department of Agriculture, Trade & Consumer Protection (DATCP). The State Land and Water Conservation Board selected the Duck, Apple and Ashwaubenon Creeks Watershed as a priority watershed project through the state's Nonpoint Source Water Pollution Abatement Program in 1994. Planning began in January, 1995. The Duck, Apple and Ashwaubenon Creeks Watershed project joins approximately 86 similar watershed projects statewide in which runoff control measures are being planned and implemented. The Nonpoint Source Water Pollution Abatement Program was created in 1978 by the state Legislature to provide financial and technical assistance to landowners and local governments to reduce nonpoint source pollution.

This project is administered locally by the Outagamie County Land Conservation Department, the Brown County Land Conservation Department and the Oneida Nation Planning Department, with assistance from the University of Wisconsin-Extension and the Natural Resources Conservation Service (U.S. Department of Agriculture). The DNR and DATCP

will administer the project at the state level. This plan will be primarily used by the County LCDs, the Oneida Nation Planning Department, DNR, DATCP, other units of government, legislators, external program evaluators and interested public.

General Characteristics

The Duck, Apple and Ashwaubenon Creeks Priority Watershed drains 265 square miles (169,910 acres) of predominantly agricultural land in Outagamie and Brown counties and the Oneida Nation Reservation in east central Wisconsin. It is located within the Lower Fox River Drainage Basin. The **Duck Creek** Watershed, approximately 152 square miles in surface area, lies within Brown County (33 percent) and Outagamie County (66 percent). Duck Creek originates in Burma Swamp, a large (approximately 2000 acres) wetland located in central Outagamie County. A total of 71 miles of named and unnamed streams are located in the watershed and all enter Green Bay at or near the mouth of Duck Creek. Land use in upstream portions of the watershed is predominately agricultural while downstream areas are dominated by residential and urban uses in and near metropolitan Green Bay. The **Apple and Ashwaubenon Creeks** Watershed is 113 square miles in size; approximately 60 percent lies within Outagamie County and 40 percent is located in Brown County. There are 171 miles of named and unnamed streams in the watershed, all of which empty into the Fox River. Land use in the watershed is primarily agriculture and residential, though industrial areas do exist in the urban areas of Green Bay and the north side of Appleton. Many intermittent tributaries discharge to Duck, Apple and Ashwaubenon Creeks and serve as the transport system for pollution to the system. The creeks are generally flashy and tend to flood with snowmelt and rain runoff; the headwaters are often dry in summer. Aquatic life habitat and macroinvertebrate communities in these headwaters are generally fair to poor in condition. Sediment and phosphorus loading from upland agricultural fields are the major sources of nonpoint pollution in the watershed.

Overall, 62 percent (165 square miles) of the Duck, Apple and Ashwaubenon Creeks watershed lies in Outagamie County, and 38 percent (100 square miles) lies within Brown County. Approximately 95 percent of the Oneida Nation Reservation lies within the watershed boundaries. The watershed is divided into eight smaller drainage areas, or subwatersheds (Map S-1).